Science Library

MAR 31 1939

The OIL AND GAS JOURNAL

MARCH 30
1939

ANNUAL
REFINERY
NUMBER

Engineering
Economics
Personnel
Plant Data

PRICE
30 CENTS

Hanlon

Buchanan

HANLON-BUCHANAN, INC.
PIONEER NATURAL GASOLINE MANUFACTURERS
TULSA, OKLAHOMA

PLUS EXPERIENCE

HOWCO FLOATING EQUIPMENT

The Oil and Gas Journal

PUBLISHED WEEKLY BY THE PETROLEUM PUBLISHING COMPANY AT TULSA, OKLAHOMA

P. C. LAUINGER, *President* — *Editor*, C. O. WILLSON

W. T. ANDERSON, *Managing Editor* — JAMES McINTYRE, *Consulting Editor*

W. T. ZIEGENHAIN, *Engineering Editor* — L. G. E. BIGNELL, *Prod. Engineering Editor*

C. K. FRANCIS, Ph.D., *Technical Editor* — W. L. NELSON, *Metallurgical Editor*

Associate Editors

T. F. SMILEY — T. P. SANDERS

DAL DALRYMPLE — PAUL REED

HARRY F. SIMONS

District Editors

Houston, 617 Caroline St.
NEIL WILLIAMS — F. L. SINGLETON

Fort Worth, Petroleum Bldg.
D. H. STORMONT

Shreveport, City Bank Bldg
GEORGE WEBER

Los Angeles, Union Oil Bldg.
L. P. STOCKMAN

Washington, Natl. Press Bldg.
HENRY D. RALPH

Saginaw, News Bldg.
O. C. PRESSPRICH

Denver, State Office Bldg.
TOLBERT R. INGRAM

New York, 415 Lexington Ave.
H. STANLEY NORMAN

Oil City, Derrick Bldg.
J. P. O'DONNELL

Chatham, Ontario, Box 136
VICTOR LAURISTON

S. H. ROURKE, Business Manager

M. L. DURHAM, Circulation Manager

Advertising

E. KLAPPENBACH, Vice President

New York, 415 Lexington Ave.
C. L. CAIN

Cleveland, Leader Bldg.
HOWARD MARKT

Chicago, 300 W. Adams St.
C. R. FARMER

Tulsa, 211 S. Cheyenne Ave.
KENNETH J. LANGLEY

Houston, 617 Caroline St.
WAYNE RIVES

Los Angeles, 1406 S. Grand Ave.
J. HOWARD TINKHAM

Cologne, Germany—1 Laudahnstrasse
A. J. CHAMBERS

Table of Contents

Vol. 37, No. 46 — March 30, 1939

News Developments

Summary ... 45
Sparks From the News ... 46
World Oil Markets Will Be Affected by Reich-Rumania Pact ... *H. Stanley Norman and Henry D. Ralph* 47
The Refining Industry ... *W. T. Ziegenhain* 48
Regional Symposia Feature of Geological Sessions ... *L. G. E. Bignell* 52
Conservation Law in Illinois Will Probably Be Delayed ... *Harry F. Simons* 55
Saudi Arabia to Produce 5,000,000 Bbls. This Year ... 57
News From State Capitals ... 58
Editorial: Still in the Woods ... 59
Obituaries ... 60
N.P.A. Cleveland Program ... 61
I.P.A.A. Considers Refinery Problem Survey ... 61
W.P.R.A. Election of Officers ... 62
Refinery Activity and Natural Gasoline ... 62
Natural Gas News and Pipe Line Projects ... 63
International News ... 66
South Texas Developments in 1938 and 1939 (map page 64) ... *Gentry Kidd* 69
Program Page ... 72

Refining Section

The Refining Industry ... *W. T. Ziegenhain* 48
Modernization of Steam and Electrical Facilities ... *Henry Flynn* 73
Increase Flexibility of Pure Oil Co. Refinery ... *Clyde L. Smith and C. R. Wagner* 76
Refinery Power Equipment ... *M. A. Hyde* 80
Torsion-Cone Consistometer ... *M. H. Arveson and L. C. Brunstrum* 83
Catalytic Refining Methods ... *V. N. Ipatieff* 86
New Developments in Steels for Oil Refinery Service ... *Martin Fleishmann* 94
Treat Cracked Distillates With Caustic Methanol Solution ... *P. L. Brandt and J. O. Hougen* 98
Extensions at Abadan Refinery of Anglo-Iranian Oil Company ... 118
Unique Bell Oil Terminal ... *D. H. Stormont* 127
Cooperative Cracking Plant at Oil City Expands ... *J. P. O'Donnell* 140
Total Capacity Operating Plants Shows Slight Decline in 1939 Refinery Capacity ... *D. H. Stormont* 147
Personnel of United States Refineries ... 148
Refineries Operating in North America ... 164

Engineering—Operating

Ryan Salt Water Disposal in Bemis Pool ... *Paul Reed* 174
Procedure Eliminates Hazards in Welding Gasoline Tanks ... *W. E. Archer* 175
Operating Ideas ... 176
Gas Line Hung Under Bridge Crossing River ... *L. G. E. Bignell* 177
Metals Progress ... *W. L. Nelson* 181
Questions on Technology ... *C. K. Francis, Ph.D.* 182

Field Operations

Field Operations Summarized ... 185
Illinois-Kentucky-Ohio ... 186
West and Central Texas and Panhandle ... *D. H. Stormont* 188
Rocky Mountain Area ... *T. R. Ingram* 190
Southwest Texas ... *F. L. Singleton* 195
Gulf Coast ... *Neil Williams* 196
Louisiana and Arkansas *George Weber* 199
New York-Pennsylvania Gas Field ... 199
Among Drilling Contractors ... 200
Oklahoma ... *Dal Dalrymple* 202
Kansas ... *Dal Dalrymple* 205
North and East Texas *D. H. Stormont* 210
Eastern Fields ... *Staff Correspondent* 214
California ... *L. P. Stockman* 216
Michigan ... *Otto C. Pressprich* 219
Canada ... *Victor Lauriston* 220
Key to Abbreviations ... 221
Wildcats ... 221

Markets and Prices

Group 3 Market ... *T. F. Smiley* 230
A.P.I. Refinery Report ... 231
New York Market ... *H. Stanley Norman* 231
Tank-Wagon Market ... 232
Refinery Prices ... 233
Crude Oil Prices ... 234

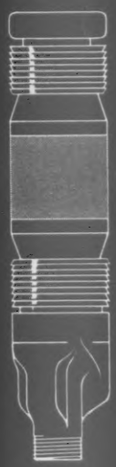
Additional Features

Personal Paragraphs ... 228
Record of Oil Securities ... 235
Equipment News ... 236
Classified Advertising ... 238
Advertisers' Index ... 240

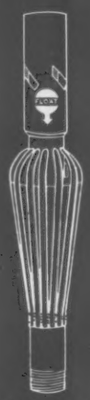
SUBSCRIPTIONS: United States, 1 year, $6.00; 6 months, $3.00. Elsewhere, 1 year, $7.00; 6 months, $3.50. SINGLE COPIES: 20 cents each. Back copies, when over a year old, 50 cents. CHANGES OF ADDRESS reaching the Tulsa office of the Journal by Saturday take effect with the following issue.

Copyright, 1939, by The Petroleum Publishing Company

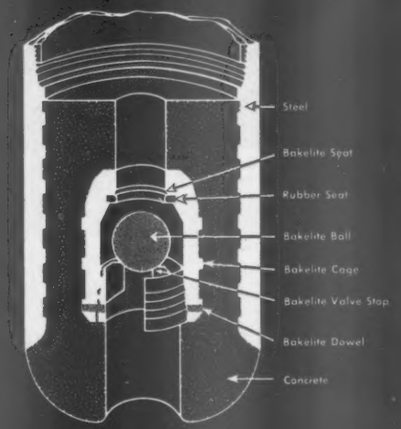
Baker Cement Wash-Down Whirler Float Shoe



Baker Model "K" Cement Retainer



Baker Cement Whirler Float Collar with Solid Bottom Baffle, with Metal "Petal" Basket



Baker Cement Float Shoe

Successful Oil Tools

ARE "DEVELOPED" NOT "DISCOVERED"

THE HISTORY of the machine age is a continuous story of discoveries . . . discoveries which opened the vistas to the remarkable period in which we now live. Discoveries, however, while tremendously important, are only the nucleus or starting point, for to be of commercial value most "discoveries" or inventions must be "developed."

It is both fortunate and unfortunate that oil tools are no exception to this rule. Fortunate because it is only through this tedious development period of trial and error that the refined product or tool can result . . . unfortunate perhaps (from the manufacturer's cost standpoint), because usually the development period continues more or less indefinitely as the result of constantly changing conditions under which the tool must operate; or requirements such as higher efficiencies which must be met.

Thus, products, such as make up the Baker Line of Oil Tools, which have been some thirty years in the development process, acquire a certain "face value" which operators have been quick to recognize and appreciate. Oil men the world over know that a tool or device bearing the word "Baker" reflects an invaluable background of accumulated experience . . . a background that results in the ability of each and every Baker tool to successfully perform the task for which it was designed.

Operating and supervising personnel, upon whose shoulders rests the bulk of responsibility for results, are doubly appreciative of this highly important background as it affords a measure of reassurance and peace of mind, the value of which is difficult to calculate in cold terms of dollars and cents.

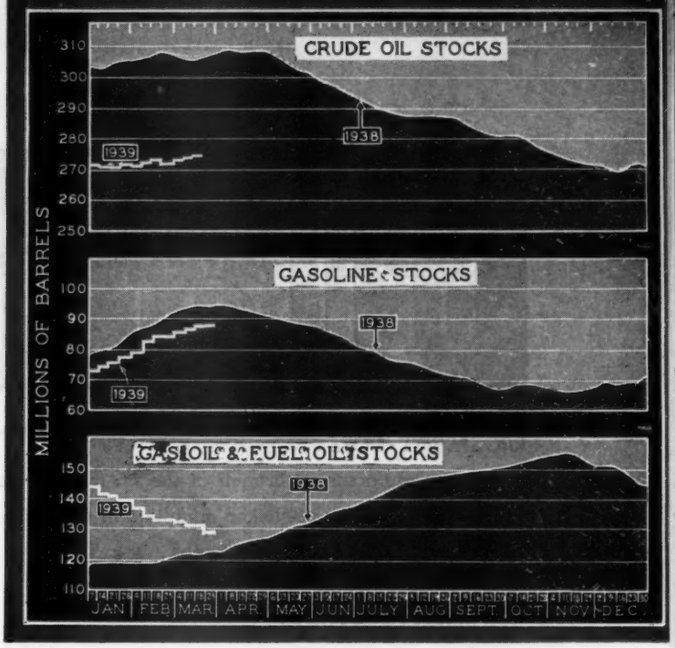
The familiar Baker slogan "Practical and Dependable," is more than simply a play on words . . . it means just that, for to be successful, oil tools must necessarily be "practical and dependable" and practicability and dependability result from constant *development* . . . not *discovery* alone.

BAKER OIL TOOLS, INC.

P.O. BOX 71, HUNTINGTON PARK, CALIFORNIA
HOUSTON, TEXAS

Trends

Operators in Texas Protest Lifting of the Saturday Shutdown


CRUDE OIL STOCKS
GASOLINE STOCKS
GAS OIL & FUEL OIL STOCKS
MILLIONS OF BARRELS
1938
1939
JAN FEB MAR APR MAY JUN JULY AUG SEPT OCT NOV DEC

THE action of the Texas Railroad Commission in lifting one of the two-day weekly shutdowns in that state, starting April 1, overshadowed all other developments in the oil industry over the past week. Those who have been encouraged by recent market trends were inclined to get on the sidelines and await further developments before making further optimistic predictions. Fear was expressed that excessive operations in the Lone Star State next month might nullify all the efforts that have been made in recent months to bring about an equilibrium in supply and demand.

CRUDE PRODUCTION *3,384,049 barrels daily average—down 5,819. One year ago 3,405,619 barrels.*

CRUDE STOCKS *273,345,000 barrels as of March 18—up 493,000. One year ago 306,380,000 barrels.*

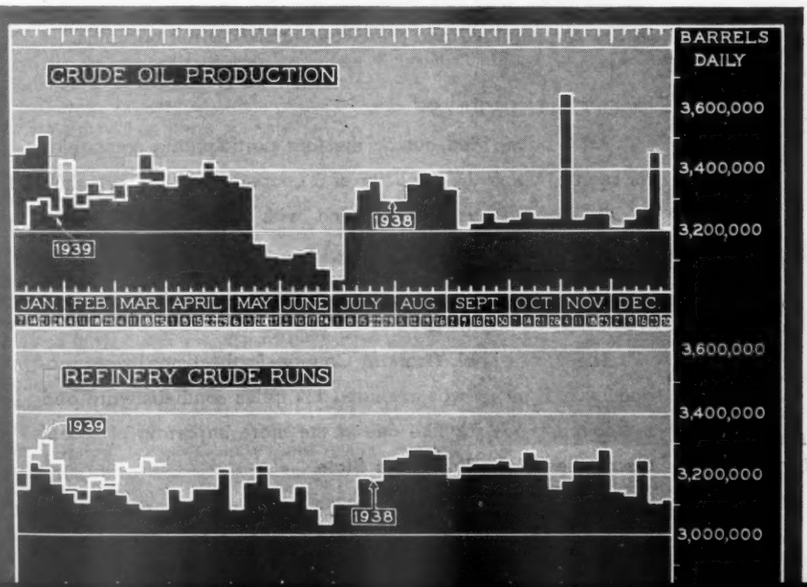
GASOLINE STOCKS *87,561,000 barrels as of March 25—up 270,000. One year ago 92,312,000 barrels.*

GAS AND FUEL OIL STOCKS *129,038,000 barrels as of March 25—down 1,333,000. One year ago 121,741,000 barrels.*

REFINERY RUNS *3,225,000 barrels daily week ending March 25—down 25,000. One year ago 3,093,000 barrels.*

The plan of the Texas commission will mean three extra days' production in April, an increase in average daily crude oil production of approximately 150,000 bbls. Developments the first of the week indicated that if the commission did not rescind its action as favored by one member, several buyers in the state would refuse to take the extra day's output, which would result in an extension of pipe line proration. In some cases the buyers explain that they do not have outlets for the extra crude. Instances are cited in which the buyers have been running crude to storage under the two-day shutdown plan and their deliveries will not increase in April. In several fields, pipe lines are operating at capacity and cannot at this time provide for additional shipments. The danger in such a situation lies in the fact that producers may offer at concessions the excess crude not taken by their regular pipe line connections. Small quantities of crude have been selling under the posted prices at scattered points in Texas and any extension of this situation would be a threat to the general market structure, not only in Texas but adjoining states.

There were no large gains in crude oil production in prospect for April outside Texas. While most states have not announced their allowables, it is known that they plan to keep their totals under the Bureau of Mines estimated demands. The exception to this rule is Illinois, whose production has been steadily increasing. With favorable weather conditions it is estimated that Illinois' crude output will average at least 175,000 bbls. daily next month. This is 10,000 bbls. more than the average over the past two weeks. California will endeavor to keep its April output within the March total.



DAILY AVERAGE PRODUCTION FOR WEEK

	Mar. 25, 1939	Bur. Mines Mar. est. of demand	Mar. state allowables	Mar. 18, 1939
Oklahoma City	116,250	.....	.....	117,800
Fitts	30,125	.....	.....	30,150
Remainder of state	305,075	.....	.....	298,525
Total Oklahoma	451,450	473,200	428,000	446,475
East Texas	372,850	.....	.....	372,850
West Texas	212,198	.....	.....	210,002
North Central Texas	111,152	.....	.....	111,050
Texas Panhandle	64,648	.....	.....	63,349
East Central Texas	96,096	.....	.....	96,098
Gulf Coast Texas	359,548	.....	.....	358,395
Southwest Texas	108,398	.....	.....	107,950
Total Texas	1,324,890	1,363,900	1,319,542	1,319,694
North Louisiana	70,550	.....	.....	70,430
Gulf Coast Louisiana	191,349	.....	.....	192,596
Total Louisiana	261,899	259,700	254,220	263,026
California	624,500	588,400	610,000	640,750
Kansas	166,750	150,300	156,850	161,175
Arkansas	53,200	50,000	.....	53,305
Illinois	163,763	125,500	.....	166,992
Eastern fields	96,950	100,300	.....	98,300
Michigan	58,337	47,700	.....	58,981
New Mexico	114,520	109,700	109,700	114,530
Rocky Mountain area	67,790	71,300	.....	66,640
Total United States	3,384,049	3,340,000	.....	3,389,868

Trends in refinery and retail markets have been mixed over the past week. Gasolines continue to show strength at interior points, but along the coast, including California, weakness rather than strength was reported. Important price reductions were made effective in the New York City area. While liquidation of the lighter distillates and gas oils continues, this end-of-the-season action has been more orderly than had been indicated earlier in the month. Reports on gasoline consumption continue to be encouraging.

SPARKS FROM THE NEWS

PROSPERITY NOTE

The manufacturing branch of the oil industry, according to a national survey published complete in this issue, is operating 463 refineries, 24 hours daily.

BAILEYS IN ARKANSAS

Be careful when you write the Baileys in Arkansas. Carl is governor, Bob is lieutenant governor and O. C. is chairman of the Arkansas Oil and Gas Commission.

NOT SO SIMPLE

The Texas Railroad Commission proposes to increase that state's production approximately 15 per cent in April by simply lifting one of its two-day shutdowns. Unfortunately, expansion of demand is not so simple.

NEW ILLINOIS DISCOVERY

***Cochran-Hubbard No. 2 Oak Grove** Cemetery, Pilot Knob Township, Washington County, Illinois. This is the first major Benoist sand pool in Illinois during the current year*

ATTENTION CENTER

A rank wildcat in Brazoria County now being tested is the center of attention in the Texas Gulf Coast.

AGAINST THE TREND

Support for a conservation law in Illinois is increasing from all classes of operators except the political ones.

TWO IN ONE

Two wildcat tests now being completed may join the Denver and Bennett pools of Yoakum County in West Texas.

BIG AS CALIFORNIA

A California company with a concession larger than that state in Saudi Arabia has five strings of tools running in a new pool discovery.

EAST TEXAS PEAK

The peak in East Texas producing wells may have been reached. Since the first of the month the abandonments have exceeded the completions.

OIL ALLIANCE

A German-Rumanian alliance, if consummated, will mean that the shifting scenes in Central Europe, for the first time, will have significance to the oil industry.

MORE TAXES

Annual statements of oil companies reflect the increasing tax burdens. One this week shows 1938 payments averaged $4,330 per employe and were four times the net earnings.

COOPERATION PAYS

After being tried out by the four participating companies for several years the capacity of a cooperative cracking plant at Oil City, Pa., has been doubled, with a new polymerization unit under construction.

NORTHWEST KANSAS

The Morel pool, Graham County, farthest northwest production in Kansas, was extended 1¼ miles southeastward and is beginning to look like one of the more important of recent discoveries in the Sunflower State.

World Oil Markets Will Be Affected by Reich-Rumania Pact

By H. STANLEY NORMAN and HENRY D. RALPH
New York Washington, D. C.

The world oil industry is deeply concerned in the possible effects of the five-year trade agreement between Germany and Rumania negotiated last week.

By its terms German capital, in cooperation with Rumanian money, will be permitted to exploit Rumanian oil fields, the Reich exchanging machinery for petroleum products.

The reports imply that German technicians will assume a vastly more important position in development of Rumanian petroleum resources. The possibility is seen that Reich aid may be enlisted in an effort to halt decline of Rumanian production and, if this prospect develops, the agreement may adversely affect the private companies.

Rumanian crude oil production skidded from 53,504,500 bbls. in 1937 to approximately 49,368,000 bbls. in 1938. The chief cause of declining production has been, according to companies operating in Rumania, the country's laws restricting the issuance of prospecting and exploratory land grants to a point that operations of this nature are ill-advised.

If, by the trade agreement with Germany, Rumania can profitably continue its restrictions on private companies and at the same time expand its petroleum reserves and production, the regulations and laws now in existence may continue indefinitely. The announced intention of the Rumanian Government to modify petroleum laws to the extent that exploratory efforts would become more attractive to private companies has been discussed for six or eight months, but no tangible move toward that end has developed.

Prior to the new trade agreement, Rumania restricted its petroleum exports to Germany to not more than 25 per cent of all other shipments.

German imports of Rumanian petroleum during the past two years are reported by the U. S. Department of Commerce as follows (Figures in barrels):

Product—	1937	1938
Crude oil	.....	158,000
Gasoline	2,957,000	2,746,000
Kerosene	15,000	67,000
Gas oil, motor oil	774,000	469,000
Lubricating oil	83,000	63,000
Fuel oil	348,000	133,000

In addition to liquid products, Germany obtained large quantities of paraffin wax, ozokerite and petroleum asphalt from Rumania. While the quantities of petroleum exported to Germany represent a minor part of Rumania's total production, the figures disclose that most of the country's gasoline exports have been going to the Reich in recent years. The reason that Germany's imports of Rumania's petroleum have not been greater is due to the previously existing trade restrictions which may be drastically altered by the details of the new agreement.

British, Dutch, French, American, and Italian capital makes up the bulk of Rumania's private oil companies. The relative position of the companies, their control and their production for the past two years in metric tons, is shown in the accompanying table. The average factor for converting Rumanian petroleum from metric tons to barrels is 7.48 bbls. per ton.

OPERATING COMPANIES

Company and control—	Production (tons) 1937	1938
Astra Romana, Dutch-British	1,644,223	1,453,992
Steaua Romana, British-French and Rumanian	944,451	738,090
Concordia, French-Belgium and Rumanian	912,330	864,021
Unirea, British	704,542	672,510
Romano-Americana, American	740,131	901,494
Creditul Minier, Rumanian	482,264	380,205
Colombia, French	429,912	384,476
Prahova, Italian	334,120	334,518
I.R.D.P., French-Rumanian	142,410	167,392
Petrelul Romanese, French-Rumanian	129,211	110,804
Foraky Romaneasea, Belgium	79,049	57,106
Dacia Starnaphta, French	72,092	58,616
Redeventa, Rumanian-French	36,814	28,552
Romano-Belgina, French-English	12,431	.....
Petrolifera Romona, Rumanian	43,280	45,107
Other companies	437,680	403,117
Total	7,144,940	6,600,000

Such information as has been received in Washington indicates Germany may now be able to supply practically all its petroleum requirements, thus reducing imports from the United States to a negligible figure. In addition to the desire of the Reich for self-sufficiency Germany is expected to make every possible effort to curtail its purchases of American petroleum and other products in retaliation for the Treasury's order imposing a countervailing duty on 25 per cent on imports from Germany, including former Czecho-Slovakia.

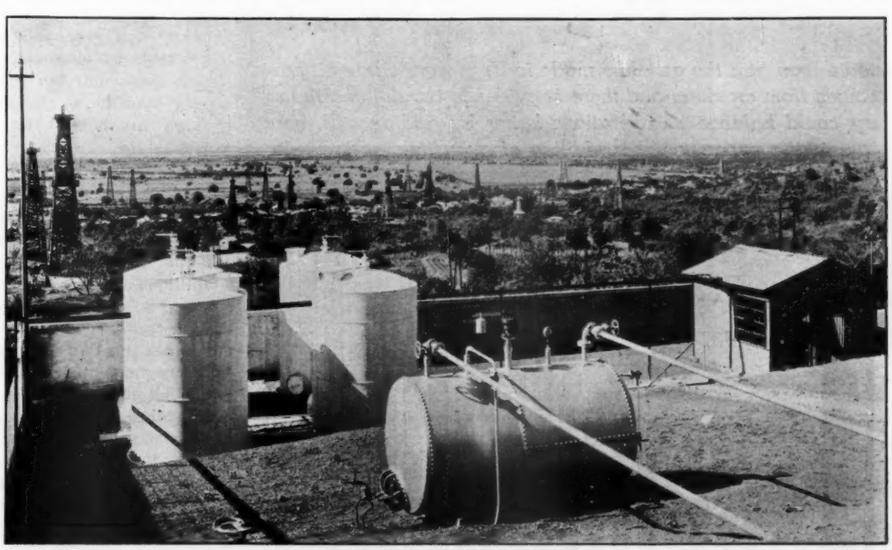
Petroleum products have constituted about 20 per cent of the value of all American exports to Germany during recent years. Shipments of petroleum products to Germany were valued at $19,148,000 in 1936; $21,968,000 in 1937, and $24,622,000 in 1938, compared with total United States exports to Germany of $101,956,000 in 1936; $126,343,000 in 1937, and $107,491,000 in 1938. Details of this trade are shown in the accompanying table.

The new German-Rumanian trade agreement, according to information available in Washington, brings Rumania almost completely within the German trade orbit with the currencies of the two countries tied together and cooperation in foreign trade, so that much, if not most, of the Rumanian petroleum heretofore going to other countries will probably go into Germany. In addition, the agreement calls for organization of a joint German-Rumanian company, financed largely by German capital, to expand Rumanian petroleum production through drilling additional wells and building new refineries.

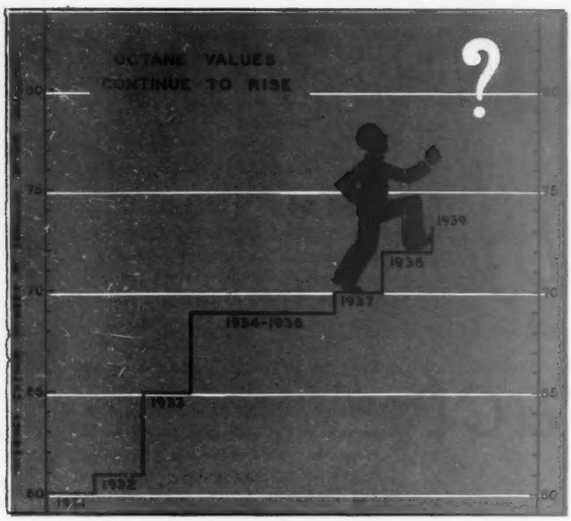
German statistics show total German imports of all mineral oil as follows: 1934, 3,174,344 metric tons; 1935, 3,826,867 metric tons; 1936, 4,261,062 metric tons; 1937, 4,315,644 metric tons. Rumanian production of crude petroleum was 8,710,000 metric tons in 1936 and 7,180,000 metric tons in 1937, and 1938 production has been estimated at 6,600,000 metric tons. Thus in spite of decreasing production it is apparent Rumania could supply the bulk of Germany's import requirements if Rumanian foreign trade becomes completely under German domination.

Capital investments in the Rumanian petro-

(Continued on Page 60)



Rasvad field, Rumania



Except for a short period between 1934-1936 the octane value of regular grade gasoline sold in U.S. has increased each year. Data based upon annual survey made by The Oil and Gas Journal

By W. T. ZIEGENHAIN

In recent years petroleum refining has consistently ranked among the three largest manufacturing industries in the United States. Its products sell at a total annual value which compares favorably with steel, meat, motor cars, bread, and printing. Petroleum refining now sells more than two billion dollars worth of products f.o.b. plants annually.

This large output of manufactured products naturally calls for the purchase of large quantities of raw materials and supplies. While the great bulk of the total amount paid out is for raw materials which are delivered in the form of crude oil and natural gasoline its purchases from other industries are quite impressive.

High Rate of Obsolescence

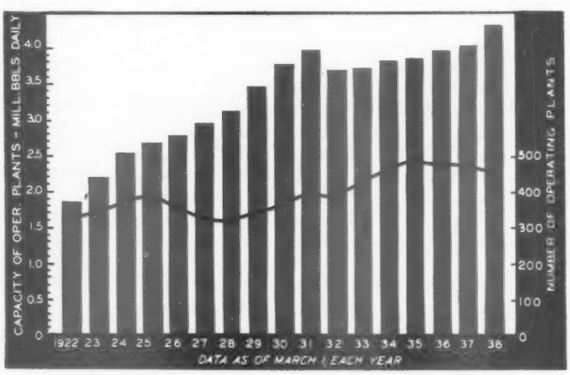
No major industry is forced to replace its equipment as fast as refining. In no other manufacturing undertaking is technological progress rendering obsolete conventional processing methods at such a rapid rate. Due to this factor alone, about as much steel is purchased annually in the form of entire units as is purchased to maintain and repair the older parts. Thereby, in recent years its purchases of steel in the form of prefabricated units have given the industry a place along side of railroads as an important customer of the steel industry.

Refining purchases of chemicals, including tetraethyl lead, calls for an annual outlay of between 90 and 100 million dollars; its purchases of electricity and water from utilities, between 15 and 20 millions and the expenditures made for marine facilities cover a wide range annually, depending upon export conditions, but average at the present time somewhere between 25 million and 30 million dollars.

The combined purchases of the refining industry made from these industries in recent years would total well in excess of 250 million dollars annually and are likely to reach 300 millions in 1939.

While this total may not appear high compared with some of the recent expenditures made for government-sponsored construction projects, it must be borne in mind that refiners continue to spend a like amount each year and this is available by creating new wealth and not by transferring wealth as is done through taxation. Value is added to the raw materials.

The refining industry, as a part of the oil industry, pays its share of direct property taxes annually. At the present time approximately 70 millions of dollars in taxes are paid on its plants and operating facilities to represent about one-third of the total property taxes paid by the entire oil industry. This of course does not include the additional sales or consumption tax levies totaling about one billion dollars which are collected annually in the form of state and federal gasoline taxes. Despite this tax item the refining industry has been able to maintain the highest wage rates established by any classification of workers. The expenditure totals annually about 170 million dollars. This money goes a long way toward maintaining hundreds of small towns and villages scattered throughout many states; refinery towns having formed around the plants as a nucleus.



Red rectangles show capacity of operating refineries in U. S. while black line shows number. Note downward trend in number since 1935. This year, for first time, capacity of operating plants is slightly below previous year

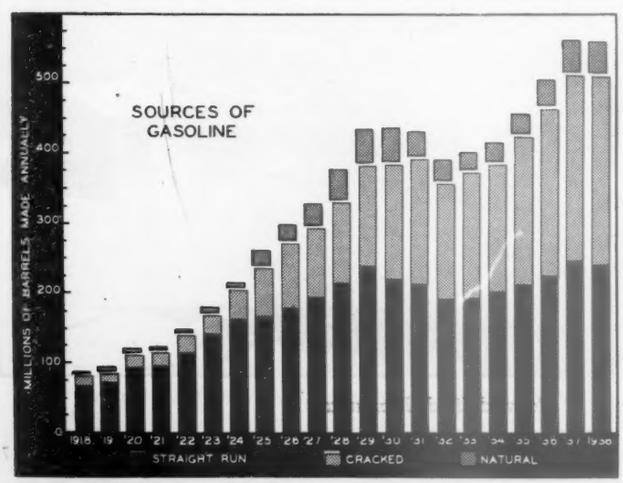
Cost of Raw Materials

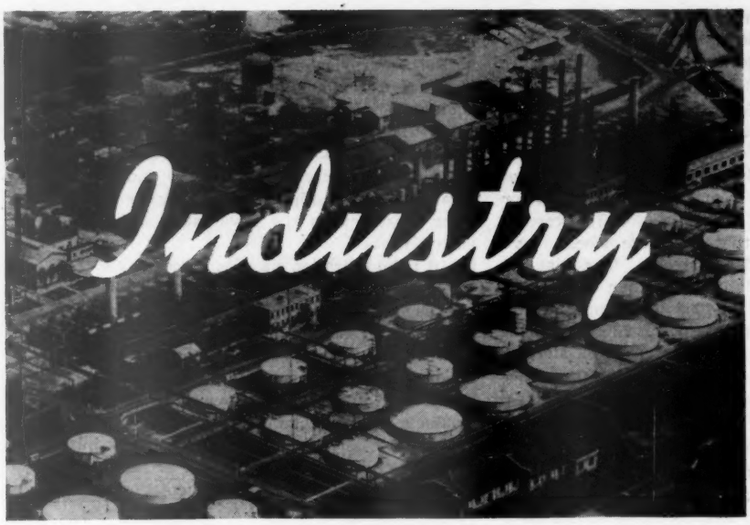
But after combining all purchases made from other industries, taxes and wages, the total falls far short of the $1,939,000,000 set out in the accompanying chart as a typical annual outlay of money by refiners. The difference, of course, is due to the cost of the raw materials, crude oil and natural gasoline. These call for an annual expenditure of around a billion and a half dollars depending largely upon the posted field price of the crude oil.

Over the life of the refining industry crude oil prices have fluctuated within a very wide range, bringing unprecedented wealth to oil producers at some periods and financial ruin to thousands at other times. In recent years there is a strong disposition to stabilize posted crude oil prices so that they may yield a fair return to the greatest number of producers. This disposition is particularly applicable to a majority of refiners who prefer a more constant level of product prices.

The old idea that refiners sought low, average posted prices on crude oil no longer applies. Statistics show that a close relationship is maintained

More than half the gasoline made in U. S. from crude oil now comes from cracking and there is evidence the refining industry could balance its operations better by adding still more cracking capacity. The addition of capacity has lagged





between crude oil prices and refined oil prices so that no advantage to the refiner accrues if crude prices are reduced, over a large area. That does not hold true, however, in isolated cases where one or a few refiners are taking the output of a local field and that oil has no other outlet. Here the producer could be at a disadvantage at times and this has happened but it has also been true under such a set-up that small refiners found it difficult to buy crude even at the generally accepted posted prices because producers were asking premiums.

This was particularly true of conditions immediately preceding and during the entrance of the United States into the World War and it will be remembered that a federal commission composed of oil executives was created to stimulate oil production and see to it that each refiner was given an equitable quantity.

Thus within a relatively few years the pendulum has swung from over-supply to shortage of crude and back again. Without serious exception the refining industry recognizes the hazards involved in keeping adequate reserves of oil, which of course involves the need for expensive prospecting. The industry also realizes that once a pool of oil is discovered it requires the expenditure of considerable money to drill and equip the area so the oil may be most economically brought to the surface. Tight, sturdy equipment is then necessary to avoid excessive evaporation. Also the period of flush production in any field is relatively short and after this period of low cost production is past it is then necessary to install artificial lifting equipment of one form or another. To operate it calls for a continuous expenditure of more money and for the life of the well. Once produced, the oil must be segregated and brought to the refinery in pipe lines, tankers, tankcars or trucks, depending upon the location and and size of the refinery and this cost generally represents from 5 to 15 per cent of the field value of the crude. This pipe line or transportation charge certainly cannot be considered excessive when compared with the relative delivery costs of other necessities. Coal, for example, worth $1 a ton at the mine is worth $3 delivered to the dealers' bins not far away. A transportation charge of 200 per cent is thereby absorbed when based upon the field or mine cost of the coal.

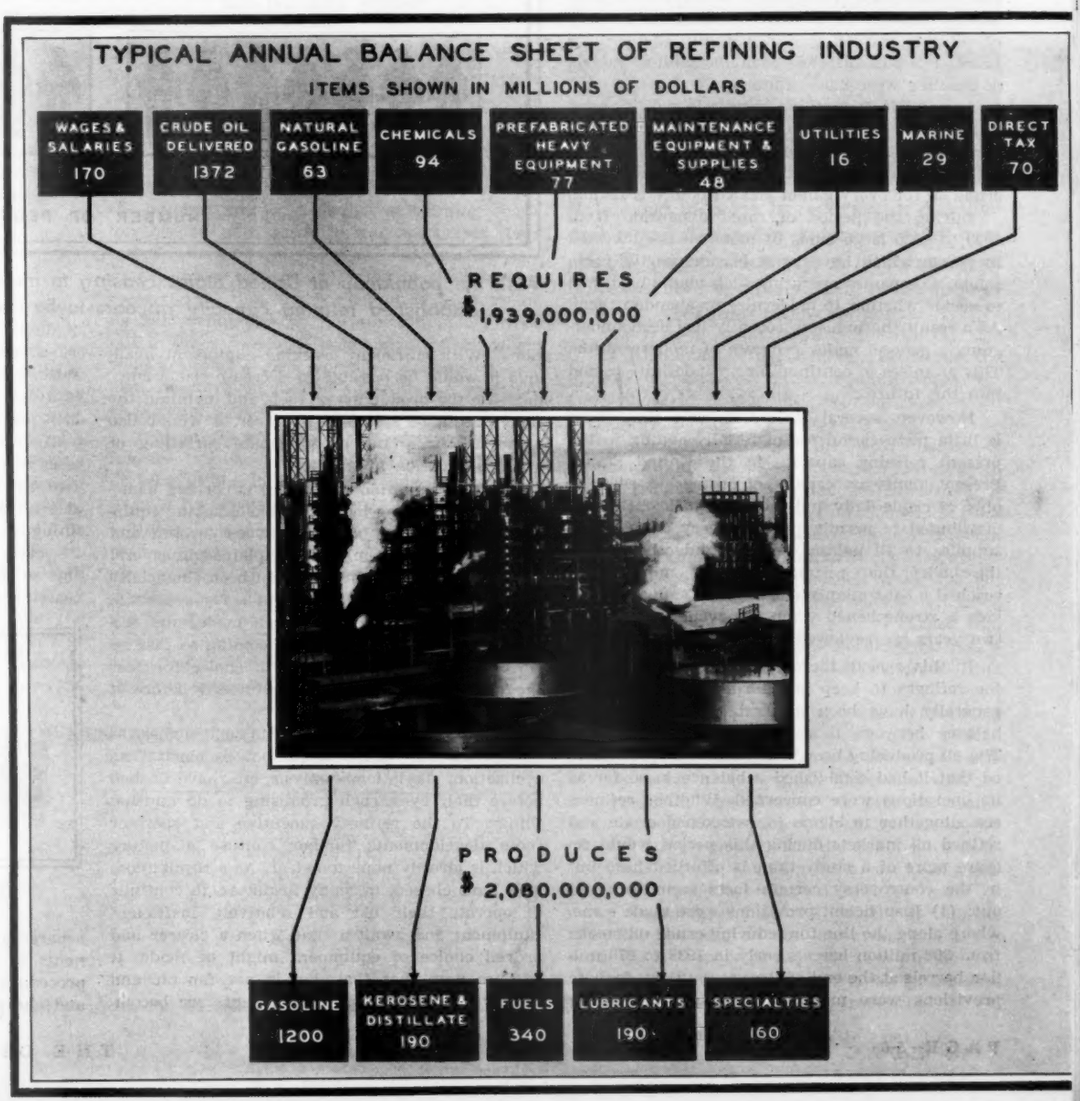
Here, natural gasoline has been treated as a raw material of refiners despite the fact natural gasoline is an industry of its own and sells not only to refiners but to jobbers of finished gasoline. Large quantities of natural gasoline are moved for export in which case it is usually blended with crude oil. In practically all cases however, the material is used as an additive or raw material, giving the desired increased volatility directly to the refinery gasoline made from crude or is recovered from the crude oil when the blend is refined.

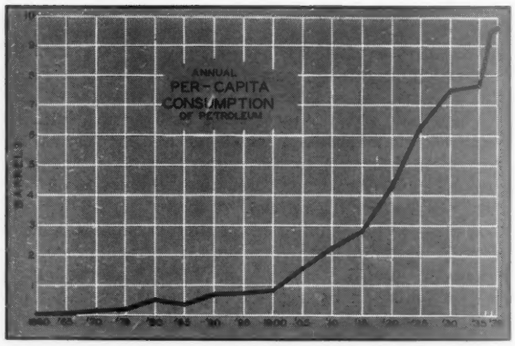
The quantity of natural gasoline moving directly to consumers in the form of motor fuel, liquefied gases and solvents is growing but still this does not represent a large volume when compared with the quantity of natural gasoline moving to refineries.

The 63 million dollars worth of natural gasoline shown in the accompanying chart as the delivered cost of this commodity probably represents 80 per cent of the value of all products of the natural gasoline industry, so it becomes apparent that petroleum refining does absorb the great bulk of the output of the natural gasoline industry.

Before leaving the subject of "cost of raw materials" it should be pointed out that in addition to the material benefits that accrue to industrial life throughout the nation as a result of direct purchases of equipment and supplies, the purchases of crude oil and natural gasoline enable oil producers and gasoline manufacturers to pay

Following chart is based upon Department of Commerce data adjusted to reflect present operations. Portrays typical set of conditions rather than actual for any one year. Data pertains to refining industry in United States only. Note heavy annual investment in products of other major industries





Consumption of oil per person in the United States showed a rapid rise between 1900 and 1937 but now appears to be levelling off

millions of land owners and royalty holders living in every state in the union, individual monthly checks in amounts of a few cents to thousands of dollars.

Growth of Refining

Remembering that the refining industry is a relatively new industry, preceding the famous Drake well of 1859 by only a few years, it is remarkable that it reached its relatively high position among manufacturing industries in such short time. Certainly, the steel, meat, bread and printing industries, as well as many other leaders have enjoyed a longer life and only the automotive offers a story of growth comparable with that of refining. It becomes all the more noteworthy when it is shown that the greater share of refining growth is crowded into the past 20 years. Prior to 1918 less than 100 million barrels of gasoline were made annually in contrast with the more than 500 million barrels in recent years. This in turn, is due pretty largely to the application of cracking from which development refiners are now able to recover 2 gallons of gasoline from crude oil for every gallon yielded before cracking.

During the period of rapid expansion from 1920 to 1930 large sums of money were invested in plants which have since become partially obsolete. Companies operating such plants have had to decide whether to modernize or abandon them. As a result the industry recently has been undergoing a general major program of modernization. This promises to continue for an indefinite period into the future.

However, several factors indicate that there is little justification for materially adding to the present refining capacity in the United States. Present plants are capable of processing 4,400,000 bbls. of crude daily and they are sufficiently well distributed to permit quick delivery of adequate supplies to all points. On this and other bases, the belief that refining capacity might have reached a saturation point is given support. This idea is strengthened when the events of the past two years are reviewed.

In this period, there has been a general plea for refiners to keep crude runs down. Refiners generally have been accused of disturbing the balance between total oil supply and demand. The oil producing branch of the industry contended that it had established a balance in so far as its operations were concerned. Whether refiners are altogether to blame for weakened crude and refined oil markets during this period would require more of a study than is afforded here but in the controversy certain facts seem to stand out: (1) Insufficient provisions were made somewhere along the line for reducing crude oil stocks from 308 million barrels early in 1938 to 270 million barrels at the end of the year; (2) inadequate provisions were made to absorb an increasing flow of oil from Illinois fields; (3) general economic recovery in the past two years has been slower than generally anticipated.

On the side of those who state that refiners are at fault for low prices it is pointed out that (1) excessive gasoline inventories have been held throughout the past two years; (2) the demand for furnace oils has been grossly overestimated and that excessive stocks have been allowed to develop. These stocks grew from slightly less than 120 million barrels early in 1938 to 155 million barrels late in the year, an increase about equal to the decline in crude oil stocks.

From the above arguments it appears that little was gained in the over-all adjustment of inventories during which period crude stocks were being drawn upon and fuel stocks were mounting. However, gasoline stocks were also declining in this period and for the past five months these stocks have remained below those of the previous year. These trends seem to indicate that an improper balance is being maintained within the refining industry between fuel oil production and gasoline production. In turn this reflects a condition which could only be corrected by increasing cracking operations. With sufficient cracking equipment available it would be possible to decrease crude runs, decrease the production of fuels and maintain the same output of gasoline. However, it would also make necessary the proportionate curtailing of crude production in the field.

If the assumption made here is correct, namely that the refining industry lacks cracking equipment to maintain a balance between gasoline and fuel oil demands, it might be explained in several ways. First, the industry has not been financially able to install cracking equipment as fast as technological improvements have been made, and secondly these improvements are coming so fast refiners seem hesitant to make a choice for fear the equipment will become outmoded before it pays itself out.

Within the past two years such names as polymerization, dehydrogenation, isomerization, cyclization, alkylation, catalysis, etc., have flashed before their eyes, each promising to do unusual things. To the refinery executive and operator these developments further confuse a picture which is already none too clear. As a result these men have chosen, in many instances, to continue to operate their old and relatively inefficient equipment and await a time when a clearer and proved choice of equipment might be made. It appears now that that day is not far off and trends in technological developments are becoming sufficiently distinct to warrant certain conclusions.

Refiners review each process as important and each has a justifiable position in the industry, but their adoption usually involves higher costs and it must be offset in some manner.

Depending upon the nature of the crude oil, the nature and size of the refinery and upon the local demand for high-octane motor fuels, the refiner must review the advantages and costs of each process.

In polymerization he sees a means for utilizing, most economically, large quantities of olefins.

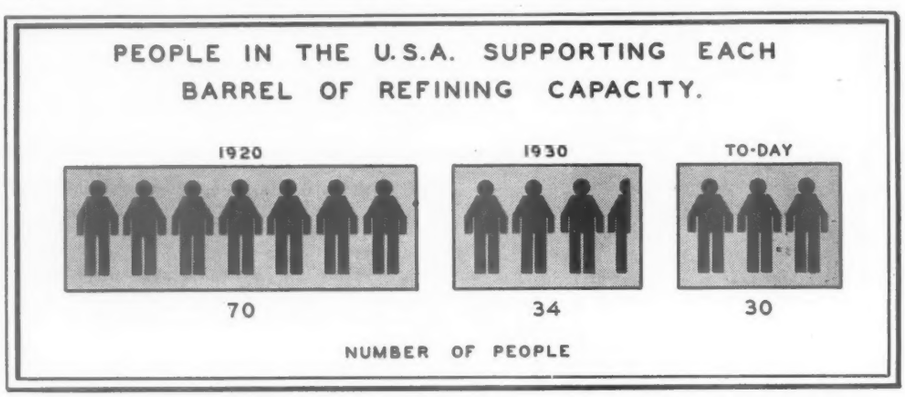
The introduction of catalysis on a large scale has provided for the use of cyclization of paraffins. By this method normal hexane, heptane, and octane may be converted into benzol, toluol, and xylols with hydrogen as a by-product. The liquid products have an octane value of 100 or better.

In the catalytic alkylation process iso-butane may be combined with ethylene, propene, or butene to produce isohexanes, isoheptanes, and isooctanes of high octane value.

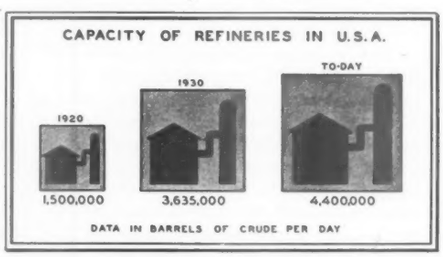
Isomerization, which promises to become an important refining procedure, permits the conversion of straight-chain paraffin hydrocarbons of low-octane value to high values. This process promises to replace ordinary reforming.

Catalytic cracking is another important process which promises to find general application. With it the manufacture of 80-octane motor fuel is a commercial realization and yields of 85 per cent are obtained.

As the refining industry accepts these processes it moves another step closer to being classified as a manufacturer of synthetic fuels. This also introduces an entirely new conception of refining. It means that within the short span of 20 years, crediting the general adoption of cracking as the beginning, the refining industry has ceased to function as a simple process for the separation of crude oil into its natural components to a rather complicated physical-chemical procedure which utilizes crude oil as a convenient and cheap source of hydrogen and carbon to be



With the population of United States ceasing to materially increase year after year the established refining capacity appears to be approaching a saturation point



Growth of petroleum refining

processed and combined to make the last possible hydrocarbon combinations to meet specific duties.

This newer conception of refining may lead to the concentration of refining in a relatively few large plants and some students believe this is rapidly coming about, but while this may be occurring there are other strong factors at work which tend to drive the industry in the opposite direction.

Other Features

REFINERY engineering, operating and technical articles prepared by men actively engaged in plant work are exclusively presented in this issue starting on Page 73. Survey of company personnel and plant operating data starts on Page 147.

In their present form these intricate technological changes do favor the erection and operation of large units. As a result only plants of more than average capacity can be balanced to utilize one or more of these processes. It is pointed out now, the minimum charging capacity for several of these processes is 1,000 bbls. per day and this must be a selected stock. This volume of material is not available in the rank and file of the 450 operating refineries. While efforts will be made to adapt these processes to smaller scale operation it may prove to be most economical to segregate all such operations in relatively few but very large plants. From these major plants, shipments of isooctane and other blending agents could be made to the smaller or secondary refineries, each of which would be located at a most strategic point to serve a definite market area. Such an arrangement is no less logical than the present practice of confining the manufacture of lubricants to a relatively few plants and shipping these to compounding plants for blending.

Future of Small Refiner

In this manner the future of the small refiner seems guaranteed despite a continued march of octane values. Also, it is well within reason to expect the number of small refineries to increase in certain areas. This is certain to occur with any tendency to boost rail and gasoline pipe line rates.

If a condition should arise in which rail rates and pipe line rates were increased it seems reasonable that fewer but larger refineries would remain within the southwestern oil producing areas while new, relatively small plants would be built along existing crude oil pipe lines, and navigable rivers within the central states. Under such a system a company which may now operate say five refineries of average size would favor the consolidation of all major operations into one or two of them in order to justify taking advantage of the latest technological developments. It might then choose to build two, three or five modern combination skimming and cracking units at strategic marketing points. The choice of location for each of these new plants would of course require study of such factors as source of crude, delivery cost of the high-octane blending stock, rail tariffs on the finished products, etc.

Oil Consumption Per Person

Earlier it was suggested that the refining capacity of the United States might be approaching saturation as revealed by an actual drop in total capacity this year. It is further substantiated when two other bases are used. Trends in each of these are shown in graphic form here. In the upper left-hand corner on the opposite page a chart appears which shows the per capita consumption of petroleum in the United States since 1860. In reviewing this chart, the first suggestion that the per capita consumption was leveling off appears during the period from 1930 to 1935. Then a normal rise is shown in 1936 and 1937 but a halt in the climb occurs in 1938.

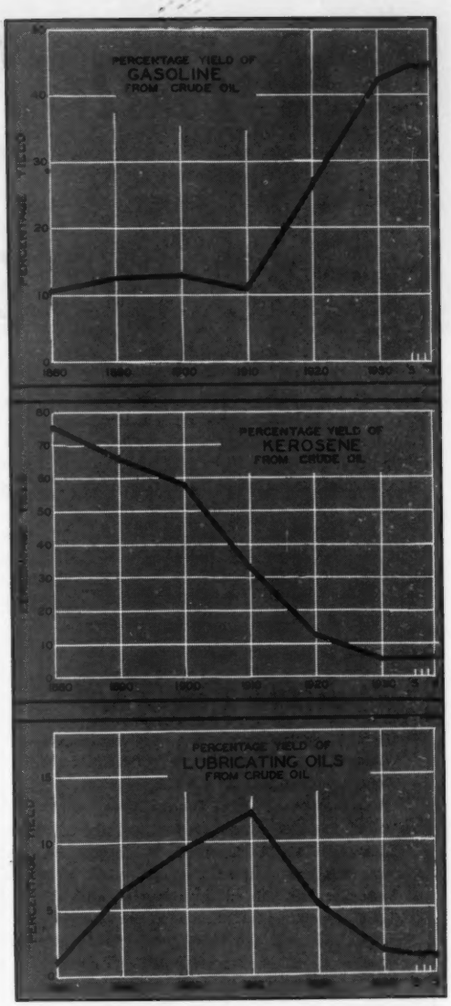
In another chart included here the number of persons in the United States are plotted against each barrel of operating refining capacity. From this graph it becomes apparent that the relationship between number of persons and capacity of plants has reached a definite leveling off. It also appears that an optimum relationship provides for 1 bbl. of daily refining capacity for about every 30 persons. In 1920 there were 70 persons supporting each barrel of capacity and in 1930 there were 34. At present there are 30.

The Refinery Worker

To the individual refinery worker and executive the technological changes taking place and the consolidation of certain plants, the segregation of refineries connected by gasoline pipe lines, etc., a disheartening picture of the future could be visualized. As a matter of fact, however, these developments may be interpreted to serve as guarantees of jobs in the future. In favor of the latter it may be said that as refining operators become more technical and specialized there is less chance for replacement of existing personnel. It also seems certain that despite increased costs the oil industry is committed to carry on its own manufacturing. Refining cannot be farmed out to other people as is commonly done where wells are to be drilled. Nor can the plants be operated satisfactorily under a leasing arrangement as is being done with filling stations.

Instead, the oil industry must maintain its refineries, large and small, and the personnel of this division of the industry may expect to continue to hold its favorable position.

In this connection it may prove interesting to review the accompanying table showing the division of employes among six major integrated oil companies. In this table are shown data received directly from each, which reflect conditions at the present time. Names have been omitted upon request but the uniformity of the information renders the names of little significance.



Note rapid increase in recovery of gasoline and rapid decline in kerosene yield over past 20 years. Recovery of lubricants now represent comparatively small percentage of the total crude refined

It will be noted that without exception, the number of employes in the refining branch exceeds those in production. Refining is exceeded only by marketing.

Likewise, because of the high degree of mechanization, the ratio of capital invested in equipment to number of employes in refining is relatively high. The indicated relationship at present is reported as $43,000 invested in equipment for every employe. A similarly high figure is shown for the producing branch while the per employe investment within the marketing branch is only $6,000.

Much has been written regarding the manufacture of chemicals and allied materials from petroleum. Almost without exception, however, these items conclude that the special undertaking involves processes and equipment quite foreign to the average refinery operator. Even the refinery executive reviews these processes with an unsympathetic eye because the products manufactured represent relatively small volumes, especially when compared with the volumes of gasoline he is used to handling. As a result, in a majority of instances where a decision must be given regarding whether the refinery go into the chemical business or not, an arrangement has been worked out whereby the raw products of the refinery are turned over to an established chemical company for further processing.

PERCENTAGE DISTRIBUTION OF MEN ACCORDING TO DEPARTMENTS

(All very large integrated oil companies)

	Companies					
	A	B	C	D	E	F
Exploration	5	3	6	..	2	2
Production	20	9	28	*15	22	13
Pipe line	7	5	10	†15	7	†12
Refining	32	30	23	‡43	38	18
Marketing	32	50	30	18	26	41
Administration	4	3	3	6	5	..
Miscellaneous	..	..	..	3	..	‡14

*Includes exploration. †Includes marine and motor transport. ‡Includes development and research.

Regional Symposia Feature Geological Sessions

By L. G. E. BIGNELL

Geologists reviewed the accomplishments of 1938 at a symposium on developments during the twenty-fourth annual meeting of the American Association of Petroleum Geologists and allied societies in Oklahoma City last week.

It was pointed out that relatively few new fields were discovered, and none of major importance, during the past year. Many old fields were extended and numerous deeper sands opened and in this manner the addition to reserves has been maintained. The work of the geological departments of oil companies resulted in many of these new discoveries but wildcats drilled without particular regard to geological data were in the main unsuccessful.

Other papers presented indicate the trend of thought toward the exploration of areas in which there are known ancient shorelines, suggesting the need of more intensive work by the geological departments because areas now known to be productive are being rapidly explored and it is becoming more necessary that the regions of old basins be given consideration and work done to develop new gas and oil fields.

The technical sessions held during the three-day meeting were divided into five groups, each covered by a symposium on an active region, or on economics and recent developments. The attendance was the largest of any meeting and in addition to the geologists the Society of Exploration Geophysicists and Society of Economic Paleontologists and Mineralogists also held annual meetings. These societies have all been growing rapidly during the past few years. The membership of the A.A.P.G. is now nearly 3,000 and the Society of Exploration Geophysicists numbers 797 active and associate members.

That these men and women appreciate the need for new oil reserves, and are studying technique to be applied to finding oil fields not easily revealed by ordinary exploration methods, was definitely brought out by the papers and discussions.

The committee on research, headed by A. I. Levorsen of Tulsa, presented and discussed maps of more than a dozen states where more than 2,000 miles of old shorelines exist and are still to be explored for gas and oil fields. This type of work is the forerunner of the application of the newer methods of geophysics and other geological aids outlining areas where exploration is to be done with the drill. While these scientists advance new ideas they are frank to admit nothing has yet been found that can be substituted for actual drilling of a favorable area if gas and oil fields are to be opened.

At the opening session the retiring presidents of the three societies presented very interesting papers. Dr. Donald C. Barton, research geologist for Humble Oil & Refining Co., Houston, Tex., discussed the "Correlation of Crude Oils with Special Reference to the Gulf Coast Crude Oils" and outlined a method by which oils from the different formations can be studied graphically and similarity shown. This study is of special interest in connection with the much-debated question of origin and migration of oil. If oils are found near their source beds, one form of exploration technique may be applied, but if they move relatively long distances from points of origin to

HENRY A. LEY

President of the American Association of Petroleum Geologists

Came Farthest

Glen B. Ruby, Jefe Div. Geologia, Yacimientos Petroliferos Fiscales (Y.P.F.), came farthest to attend the A.A.P.G. sessions. He left his headquarters at Buenos Aires a week before the convention opened and flew the 7,500 miles to Oklahoma City in six days. By boat and rail at least 21 days would have been required. Mr. Ruby has been with the Y.P.F. over the past 18 months. He is widely known in the United States where he formerly was connected as a geologist with oil companies. He was also active as a consulting geologist for several years. He will return to Buenos Aires early in April.

Luncheon group of 79 geologists of Standard Oil Co. of New Jersey and subsidiary companies

PAST PRESIDENTS OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS

William B. Heroy, George C. Matson, H. B. Fuqua, A. I. Levorsen, Donald C. Barton, J. Elmer Thomas, Alexander Deussen, Alex W. McCoy, Frederic H. Lahee, W. E. Wrather, and Frank R. Clark

points of accumulation then another method of searching for new pools must be applied.

E. H. Sellards, president of the Society of Economic Paleontologists and Mineralogists, and director of the Bureau of Economic Geology, University of Texas, Austin, Tex., delivered his address upon "Some Vertebrate Fossils of the Texas

SCOTT GAYLE

President of the Society of Economic Paleontologists and Mineralogists

Gulf Coastal Plain," stressing the value of such fossils for correlation purposes.

"The Relationship of Geophysics to Geology" was the topic upon which F. M. Kannenstine, president of the Society of Exploration Geophysicists, and head of Kannenstine Laboratories and Independent Exploration Co. of Houston, Tex., spoke. This paper defined geology and geophysics as applied to the oil industry, and showed their related functions in the past and present attempt to define the attitude of sedimentary beds. In reviewing geophysical methods it is pointed out that the reflection seismograph has thus far more nearly approached the mapping of subsurface structure as it actually exists than any other method. It is indicated that sedimentary basins in general are as closely and as highly faulted as the positive areas surrounding them. The detailed structure of many of these basins, however, is obscured by alluvium, glacial drift, continental deposits, or sedimentary beds of younger age than those from which production may be found. Since these areas enormously exceed those in which detailed information has been obtained, there still remains a vast amount of exploration to be done.

These and many other papers all indicate the thought being given to the location of hidden pools and stratigraphic traps in which gas and oil has accumulated, similar to those already found, the outstanding example of which is the East Texas field. There seems little doubt the geologists and their fellow scientists will continue to discover new oil fields at a rate that will assure an ample supply of oil. That this new type of work has not been more actively done is due to the fact that pools already opened have been putting into reserve oil for the immediate needs, but it is predicted that, in the not-far distant future, some new oil-producing states will be added as this new technique of finding oil is applied.

The economic session on Thursday afternoon dealt with the accomplishments during the past year. Papers by Sidney Swensrud and Dr. Frederic H. Lahee were published in the March 23 issue of The Oil and Gas Journal. Following those papers various active areas were discussed and H. B. Bybee and Berte E. Haigh, geologists with University Lands, Austin, Tex., reviewed "Developments in West Texas and Southeastern New Mexico during 1938." Drilling in this area was 21.2 per cent less in 1938 than in 1937. Four new reserves were discovered, one rejuvenated and extensions to several existing fields were made. On the other hand, wildcatting and outpost operations were 23.4 per cent greater than in 1937 but favorable results were rather limited. Southeast New Mexico had 66 wildcats and outposts against 43 in 1937, with two new discoveries and one rejuvenation. West Texas had 192 wildcat and outpost operations compared with 166 during 1937 resulting in two discoveries. Several fields in the area were extended, some vertically as well as laterally. A few outposts were definition wells, but the limits of some of the important fields are yet unknown. Of all the operations 89.6 per cent were wells drilled in known oil fields.

The next paper, by Gentry Kidd, geologist, Stanolind Oil & Gas Co., San Antonio, Tex., on "Development in South Texas in 1938" is published in this issue of The Oil and Gas Journal (pages 64 and 69). Mr. Kidd states that 39 new fields were discovered during 1938. In addition 55 new sands in the older fields were proven productive. This record is exceeded only by 1937 and is above the records of prior years, both in number of discoveries and in probable additions to reserves.

"North Central Texas Developments, 1938" were discussed by J. J. Maucini, geologist, Continental Oil Co., Wichita Falls, Tex. Strawn sand developments and discoveries materially increased in the area last year. This is the major producing zone in the Wichita Falls area and the scope of Canyon and Cisco "pays" in the Abilene district also increased. Important extensions were made east and west in the K.M.A. field and a new discovery in the Strawn in the Wichita Falls district was the Hull-Silk pool in northern Archer County. A Strawn pay was opened in Montague County by Sinclair-Prairie Oil Co., in the Delaware Bend area of Cooke County and the other by completion of No. 1 Burnett near the town of Nocona in Montague County.

In the Abilene district, the Chittenden pool northwest of Anson, the Ness pool southeast of Anson, and the Steffins and Hedrick pools were opened in Jones County. An important extension was also made to Noodle Creek and the Avoca pools. In Shackelford County a new pool was

Orby C. Wheeler, International Petroleum Co., Toronto, Ontario, Canada; Theodore A. Link, Imperial Oil, Ltd., Calgary, Alberta, Canada

Edwin B. Hopkins, independent operator, Dallas; Carroll H. Wegemann, Omaha; Donald C. Barton, Humble Oil & Refining Co., Houston; Chester Naramore, secretary, petroleum division, A.I.M.E., New York City

opened on the Diller ranch and in Coleman County the Novice pool was brought in about 1 mile west of the town of Novice.

Additional discoveries in the Sparta-Wilcox sand zone along the Conroe trend, both in Texas and Louisiana have assured this area an intensive period of activity for the immediate future, according to O. L. Brace, consulting geologist, of Houston, Tex. His paper, "Review of Developments in 1938, Gulf Coast of Southeast Texas and Louisiana," cited the progressive change that has been taking place in the development of the structural type rather than major piercement domes with very shallow salt cores, to deeper piercement domes, to deep-seated major closure domes, and finally to the important minor closure features of today on the Gulf Coast since Spindletop discovery.

This change in discovery type partially explains the fact that despite a very active year throughout the coastal districts of Texas and Louisiana, newly discovered reserves resulting from recent exploration do not compare favorably with the totals of previous years. The 20 new producing areas of Louisiana are characterized in a majority of cases by production from sands at great depths, where gas-oil ratios are sufficiently high to be a troublesome factor. Of the nine Texas discoveries, three may justify a major rating, while the remainder are of unproved potentiality or of very questionable merit.

There were approximately 2,000 wells completed during 1938 in Oklahoma, according to E. F. Shea, Stanolind Oil & Gas Co., Tulsa, a decrease of 30-35 per cent from the preceding year. The seismograph continues to be the chief exploration method employed in the search for new structures, but there was a 20 per cent reduction in the average number of crews compared to the preceding year. Most of these crews were engaged in closer detail work in areas already explored.

Of the 2,000 completions, 220 or 11 per cent, might be classified as exploratory wells. By far the greater number of these were adjacent to producing pools in the central part of the state. As a result of the drilling of those 220 wildcat wells, 42 new producing areas were discovered. Of this total, 16 might be considered as extensions to known pools and 26 as new pools. Pennsylvania sediments account for the production in 19 of the discoveries, and four were found in Siluro-Devonian and 19 in Ordovician.

"Development in Kansas in 1938" was discussed by Rycroft G. Moss, Phillips Petroleum Co., Wichita, Kans., who stated that drilling activity dropped about 41 per cent from the previous year. The dry-hole percentage rose about 1 per cent and the average initial potential of oil wells fell nearly 10 bbls. The use of acid in southwestern Kansas gas area increased the initial potential in that area about 25 per cent.

The recent discovery of Devonian production in the old Sandoval field focused attention on Devonian possibilities in the Illinois basin, according to Alfred H. Bell, and George V. Cohee, of the Illinois State Geological Survey, Urbana, Ill. Their paper reviewed the known occurrences of oil in Mississippian below the Ste. Genevieve (McClosky), and in the Devonian, Silurian and Ordovician systems in Illinois.

It is estimated that 143,000,000 bbls. of known reserves were added in California during 1938 through geological discoveries of new fields and zones, according to Harold W. Hoots, chief geologist, Richfield Oil Corp., Los Angeles, Calif. Present estimates are conservative and will be increased annually by extended developments of these new fields. Wildcat drilling declined and geological activity tends to decrease. Ninety-five per cent of the new discoveries in California were made by large companies supported by sizeable and competent geological staffs.

HERBERT CLARK HOOVER, JR.

United Geophysical Co., who delivered a paper on "The Divining Rod" before the Society of Exploration Geophysicists

Few, if any, lucky accidental discoveries appear to have been made in the past 20 years and during the last decade only one sizeable discovery has been made by an independent operator. This is due principally to the expense attached to adequate geological exploration and the drilling to depths now generally required. The reflection seismograph under geological guidance accounted for three of the five new fields of 1938, while field and subsurface geology were responsible for the other two.

Drilling operations in the Rocky Mountain region during 1938 reached a total of 483 and were divided as follows by J. M. Kirby, and H. N. Hickey, the California Co., Denver, Colo.:

Wildcat Wells

Comp.				
Oil	Gas	Abd.	Susp.	Drilling 1-1-39
5	3	43	61	48

Field Wells

Comp.				
Oil	Gas	Abd.	Susp.	Drilling 1-1-39
156	34	52	33	48

This activity resulted in the discovery of three fields in Wyoming and one each in Colorado and Montana with the North Cut Bank discovery in the Moulton sand (Kootenai-Lower Cretaceous) of the first oil producer although several gas wells have been completed in this zone. Three proven fields were extended, two in Wyoming and one in Montana. Deepening and recompleting wells in proven fields resulted in a Tensleep discovery at Mahoney dome, Carbon County, Wyoming, and in a small oil well from shallow Wasatch sands in Hiawatha, Moffat County, Colorado. Several gas fields were also opened.

The technical session of the Society of Economic Paleontologists and Mineralogists was devoted to the discussion of fossils and fauna and, while highly interesting to the members, it would be hard to follow by the layman.

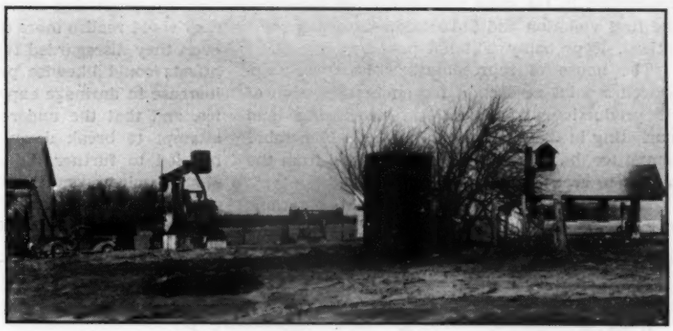
The Society of Exploration Geophysicists started its technical sessions on March 21, one day in advance of the general meetings, and continued through Wednesday and Thursday. The papers dealt with scientific discussions of various phases of geophysics as applied to the oil industry and the Wednesday afternoon session was devoted to the electrical methods employed.

All three societies elected new officers. Henry A. Ley, chief geologist for Southern Cross Oil Co., San Antonio, Tex., is the new president of the A.A.P.G., succeeding Dr. Donald C. Barton. L. Murray Neuman, consulting geologist, Carter Oil Co., Tulsa, is vice president; Edward W. Owens, Wentz Oil Corp., San Antonio, Tex., secretary-treasurer, and Walter A. Ver Wiebe, University of Wichita, was reelected editor.

The Society of Exploration Geophysicists elected E. A. Eckroat, Gulf Oil Corp., Houston, Tex., president; W. T. Born, Geophysical Research Corp., Tulsa, vice president; J. H. Crowell, Independent Exploration Co., Houston, Tex., secretary-treasurer, and R. D. Wycoff, Gulf Oil Co., Houston, editor.

The Society of Economic Paleontologists and Mineralogists elected Gayle Scott, professor of geology of Texas Christian University, Fort Worth, Tex., president; Herschel L. Driver, Standard Oil Co. of California, Los Angeles, Calif., vice president, and H. B. Stenzel, University of Texas, Austin, Tex., secretary-treasurer.

Conservation Law For Illinois Will Probably Be Delayed



In the Louden field four wells were drilled on a store corner lot and a school property by independents in addition to the well drilled by a major company in the regular 10-acre spacing. It has been estimated these four wells have produced more oil than could be contained in a vessel having a volume equal to the surface of the leases times sand thickness

By HARRY F. SIMONS

CENTRALIA, Ill., Mar. 27.—While support for a conservation act in Illinois similar to those in effect in several oil states is gaining rapidly, it does not appear probable at this time that the legislature will take the necessary action at the regular session which has been under way since the first of the year.

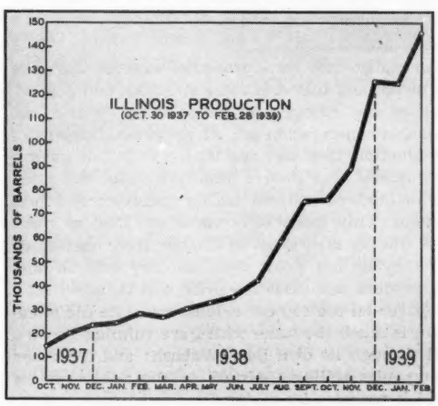
Support for an act which will end the confusion that is apparent in the production and sale of Illinois crude is gaining momentum from all classes of operators but there is still sufficient opposition to delay final action.

The legislature has several bills of doubtful merit which are being studied in committee while the tax assessors are preparing to place a value on leases and royalty interests in the state for tax purposes.

Early in March the argument over whether the Independent Oil Producers and Royalty Owners Association should definitely make a stand for regulation split the organization, with another independent group, the Petroleum Association of Illinois, being formed. The original independent group was organized last summer to discourage any restriction of Illinois production as long as the price was maintained.

Many members of the organization felt the time had arrived for some stabilizing legal measures in view of the drop in price during the past year from $1.25, when the organization was formed, to $1.15 at present. This is the price paid by the major purchasers in Illinois but much of the state's production is being purchased by independent buyers on contracts that are based on prices posted by Carter Oil Co. (Oklahoma Pipe Line) and Texas Co. (Central States Pipe Line). The exact amount of oil moving and the price paid varies from day to day, but it averages at least 25,000 bbls. daily with the price varying from as low as 65 cents to as high as 90 cents.

Immediately following the formation of the Petroleum Association of Illinois, Frank T. Egan, secretary-treasurer, who resigned the same title with the old group, announced the new association would actively oppose any attempt to regulate the production of oil in Illinois until the state was producing all of its own requirements.



Requirements are approximately 165,000 bbls. daily; production 157,000 bbls. daily.* Any reduction in price will not affect the association's stand on this matter, according to Mr. Egan. President of the new group is R. A. Hose, Bloomington, and S. D. Jarvis, Decatur, is vice president. Directors are L. L. Benoist, Mount Vernon; C. Hayden Davis, Springfield; I. D. Lain, Bloomington; E. M. Self, Salem; and C. T. Smith, Flora. Messrs. Benoist, Smith, Jarvis, and Lain were directors of the old organization.

John Pugh, Centralia, is the president of the older independent group; A. R. Thompson, Mattoon, vice president; directors, Tyler Andrews, Lawrenceville; Claude Bell, Centralia; G. H. Blankenship, Centralia; J. D. Reynolds, Centralia; William P. Young, Pekin, and C. J. Hass, Centralia. This organization immediately announced it would seek legislation to force all purchasers of oil to take ratably from all wells and pools, orderly development of properties, and a fair price for Illinois oil.

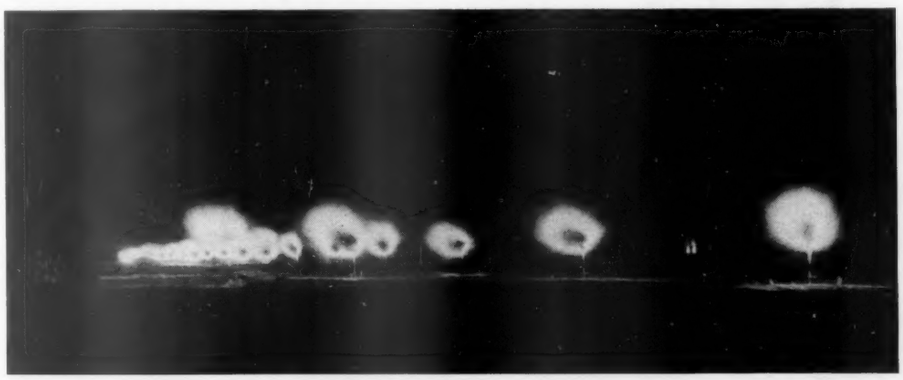
Minimum of Laws

Illinois has a minimum of laws concerned with the development of oil lands, the principal being the requirement of a permit from the state director of mines to drill and the application for a permit and supervision of the plugging of abandoned wells. There are no spacing regulations, none on offsets, no ratable taking laws and no requirement to file a log of the well with the state. As there is no production tax, there is no filing of production figures with any governmental unit.

The state Geological Department at Urbana receives its information on geology, production and field developments through the courtesy of the scouts organization. It also maintains several scouts in the field.

At the present time a number of laws have been introduced in the legislature that cover some of the above problems but no bill has been presented that covers the situation comprehensively. The committee on conservation of the house of representatives recently recommended rejection of the Vaughan-Parker bill requiring drillers to abandon wells within a certain period (60 days) after drilling is completed, unless such wells are producing.

A bill introduced in the senate (S.B. No. 82) by Parish on January 30 and referred to the committee on oil and gas conservation, would requiring the filing of a log every 15 days with the



Night view of Texas Co. new camp west of Salem, Ill., when flares were being used to dry out the ground to facilitate building, before the company got its pressure maintenance plant into operation

*From "Economic Position of the Illinois Oil Industry," by Walter H. Voskuil, mineral economist, Illinois State Geological Survey, The Oil and Gas Journal, Oct. 27, 1938, p. 102.

Department of Mines and Minerals, report to include the manner of drilling, location, depth, gas-oil ratio, production and such other information the department may require. It also allows the department to establish a gas-oil ratio for the production in the state with a fine of $5,000 for the first violation and $10,000 for subsequent violations. It probably will not pass.

The house of representatives last week approved a joint resolution for an investigation of oil production, transportation, processing, and marketing in the state, providing for a 10-member committee, half from the house and half from the senate, to report not later than April 30.

Many companies are cloaking their operations in mystery and the total amount of oil produced in Illinois is extremely hard to determine; the price paid is likewise a mystery. Scouts are becoming distrustful of other scouts and general secretiveness prevails. The major companies are not affected seriously as all of them have outlets for their production, although in most cases they have voluntarily limited themselves to a figure which they estimate will conserve the sand pressure. The two principal fields, Louden and Salem, are being repressured by Carter and the Texas Co.

An East Texas refinery moves to Illinois and starts operating among the oaks and elms instead of the pine trees. Capacity is 1,500 bbls. daily

Carter Oil Co. with its Louden spread and again with its Dix field is fortunately situated as there are not enough leases held by independents to force too much offsetting and overproduction. Many of the independents also agree with the Carter program for producing the huge field. Texas Co. in the Salem field is not so fortunate as it has been forced to produce more oil than it wanted by offsets mostly on small tracts.

Majors Have Market

The major companies in most instances have kept up with production of offset leases by opening their wells also. They have a better chance of getting rid of their oil than the independent operator. In some unusual cases, one large purchaser has allowed independents to deliver more oil than the pipe line allowable where there is competition with an offset that is producing unrestricted and selling oil under the market. Both larger companies and independents have done this in an effort to obtain voluntary restriction among the offsets.

The trouble started early last summer when the Centralia townsite production began taxing the capacities of the Sohio (formerly Owensboro) pipe line system and that company started taking only 20 bbls. per day from each well. Some independents in their efforts to market more of their production began making contracts under the market price for all production in excess of that taken by Sohio. As heavier production developed in Salem and Louden, more of the cheap oil became available and independent purchasers began making contracts to supply refineries with crude at prices under the market.

Some independents realized this was starting something that might be difficult to stop and refused to make such contracts but others figured that by producing more oil at a cheaper price they could realize more on their investment. However, they disregarded two things: that the major offsets could likewise produce more oil and the increase in drainage expected would not materialize, and that the under-market purchaser would attempt to break down the price further. This has led to further reduction in price to where almost twice as much oil has to be produced to obtain the same income.

Many of the independents in Louden and Salem realize they have proration whether they like it or not and that it is more stringent and dependent on the majors than it would be under a reasonable conservation act. At the present depths of production they can see where they can have a pay-out of less than a year providing the price is maintained, ratable taking enforced, and production only moderately curtailed. Most of them are finding it difficult to finance their operations as they do not know what oil they will be able to produce nor what the price will be when sold.

Over on the eastern side of the state the situation is much the same with Pure running its own oil through its own line (Wabash) and the other companies selling their oil to the Sohio system which prorates its takings.

One group of independents figures that a conservation law will remove inequities and allow them to develop their leases while the opposing group declares that unrestricted production will develop Illinois faster. The Illinois independent operators who have made long-term contracts for selling their oil under the market are absolutely opposed to limitation of production.

Chances of getting any restriction through the legislature are practically nil in view of the political situation in Illinois. Normally the state is rather evenly divided politically and a switch of a few votes often carries or defeats a measure. The Chicago block, composed mostly of Democrats under the domination of the Kelley-Nash organization, votes practically as a unit. This group is definitely opposed to any restriction. This puts the oil industry in the state in the hands of a political group that has little direct connection with it like the representatives of the down-state voters who are dependent on the votes of royalty owners and farmers on whose land the wells are being drilled.

Acting Governor Opposed

Lieut-Gov. John Stelle is in the governor's chair during Gov. Henry Horner's absence in Florida. Stelle's refusal to cooperate with the oil compact commission was given at St. Louis recently and his position was further clarified in a letter to the Petroleum Association of Illinois recently in which he encouraged that organization in its efforts to fight proration. Stelle opened his letter with "I want to congratulate you on the organization of an association which to me means a protection for the people of Illinois in getting for them an orderly development of our Illinois oil fields." He added that the closeness of Illinois fields to the market would be an aid in the resistance to restriction.

The acting governor's recent action in recommending a valuation of $10 per acre on all undeveloped leases and of $1,000 per acre on land having wells producing more than 50 bbls. per day is significant. It gives the state an unusual method of taxing the oil industry without requiring any figures being compiled on production. The suggestion of the tax was made to the assessors association with the states attorney, John E. Cassidy, assuring the assessors it was legal and Alfred H. Bell, of the Geological Department estimating that to be a fair amount.

The action of the state is based on a decision of the Supreme Court in 1908 holding that leases granting mineral rights are real estate and taxable as such. The decision held that the surface rights and subsurface rights were separable. However, a point not discussed by the governor with the assessors was the increase in the value of land not leased. Under the decision on which the state is acting, landowners in the oil area may find their land values increased by $10 per acre. This will not be very popular with the farmers in view of the high tax rate.

With Gov. Horner in office the fight for regulation would have been a close one. As long as Lieut-Gov. Stelle sits in the governor's chair proponents are going to have to marshal all of their arguments.

An outstanding example of present-day operation in Illinois. This was completed as a fairly good well in Centralia townsite, but due to mal-operation was abandoned nine months after it was completed

Saudi Arabia May Produce 5,000,000 Bbls. of Oil in 1939

By H. STANLEY NORMAN

Heavily shaded area California Arabian Standard Oil Co. concession, Saudi Arabia

Production of at least 5,000,000 bbls. of crude oil from California Arabian Standard Oil Co.'s large concession in Saudi Arabia in 1939 is in prospect and even this figure may be doubled or tripled if conditions in the coming months warrant withdrawals at an accelerated rate. Current production is confined to 5,000 bbls. per day from three wells completed in the 4,700-foot zone.

Starting in February, California Arabian Standard Oil Co. launched its development program of Dammam Dome on a more intense scale with five strings of rotary tools. Excluding two tests which are now nearing recompletion stage in the deeper pay at 4,700 feet, five wells of the original program remain to be carried down from around 2,200 feet.

Discovery of the prolific high-gravity producing zone at 4,700 feet was registered in March, 1938, but it was October before two additional shallow wells could be deepened to the more attractive oil section. With exception of one wildcat test now drilling at shallow depth at Abu Hadriya, 100 miles northwest, current exploitation work is confined to Dammam Dome in eastern Saudi Arabia. The productive Dammam Dome is less than 50 miles from the Bahrein Petroleum Co. refinery on Bahrein Island and pending completion of facilities for shipping larger quantities Saudi Arabian production is held to 5,000 bbls. per day.

Saudi Arabian production is transported to the Persian Gulf coast by a 6-inch pipe line terminating at Al Khobar and from there it is moved to Bahrein by barge. Planned for completion this spring is a deep water loading terminal off the shore at Ras Tanura. California Arabian Standard Oil Co. is now completing a 10-inch pipe line from wells on Dammam Dome to Ras Tanura and a 12-inch submarine line extends from the shore into Persian Gulf waters where depth is sufficient to load ocean-going tankers. This additional transportation artery from the field to Ras Tanura and into deep water is scheduled for completion in the spring when production may be stepped up to the present efficient capacity of about 10,000 bbls. per day.

All under-sea pipe line is coated and about 15 miles of the 10-inch line that crosses the desert from the field to the terminal at Ras Tanura is coated and buried. Remainder of the 10-inch line, about 28 miles of the carrier, is resting above ground on desert sand.

The California Arabian Standard Oil Co., wholly owned subsidiary of Standard Oil Co. of California, launched its exploratory drilling program in Saudi Arabia in 1935 with 10 wells. The discovery well, No. 2 Dammam, encountered a prolific high-gravity oil zone at 2,152 feet in 1936, but soon commercial value of the shallow pay became doubtful as the initial flows settled rapidly. From the meager sustained output of the first wells it was concluded deeper drilling would be necessary. Discovery of the so-called Arab zone at 4,700 feet in March, 1938, was followed by decision to deepen the other nine shallow wells and to establish an outlet for the greater volume of crude.

Sufficient exploratory work has transpired to indicate that the productive area of Dammam Dome will at least equal the Bahrein Island structure which covers approximately 12,000 acres. Other encouraging prospects are making their appearance as work goes ahead in Saudi Arabia.

The California Arabian Standard Oil Co. concession covers an area somewhat larger than the entire State of California and has not been fully explored. California contains 158,297 square miles or approximately 101,310,080 acres.

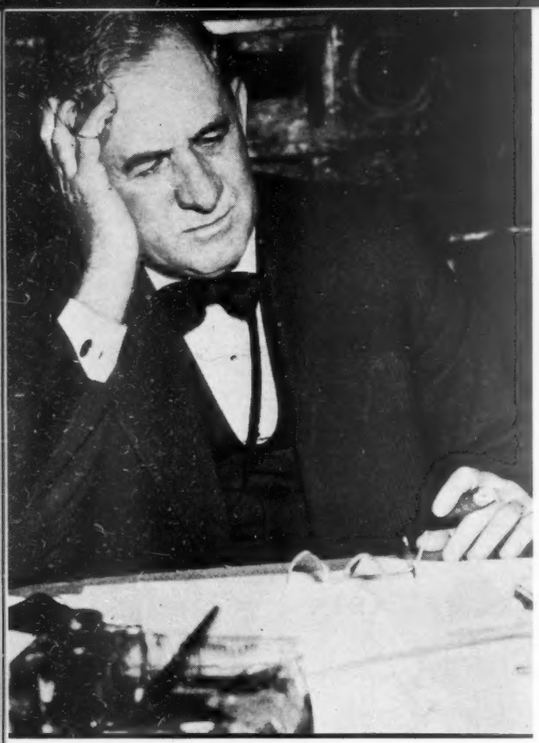
Saudi Arabia is extremely hot and windy. In spring the mercury often runs above 100° F. and stays there for days at a stretch, and in summer it reaches 115° F. The wind can be equally persistent, frequently filling the air with sand far out over the Persian Gulf. Climate wrote the prescription for the cottages now being built and occupied at Dammam. In construction, the cool, low cottages, are a combination of frame and native masonery. The native parts are limestone rock, used as wall material or filler, and gutch (gypsum), which is used in plastering. All of the new houses are air-conditioned. In each house the air is circulated past coils through which cold water is kept circulating. There are 180 men from the United States in Saudi Arabian oil operations, a few accompanied by their families. At the end of last year the California Arabian Standard Oil Co. employed 2,500 Arabians in the various projects of building the camp, pipe line and water terminal.

The power plant at Dammam is still made up of small units, but the time is approaching when more permanent arrangements will be desirable since power requirements are constantly expanding to meet consumption demands of the camp.

Under the existing arrangements there is an abundance of passenger and freight traffic between Al Khobar and Bahrein. To provide convenient and more comfortable gulf transportation for its men and their families the company has built two 53-foot, Diesel-powered boats to carry passengers, mail and express between the two points. Two slightly larger boats, are used as tugs in shuttling the barges to and from Bahrein Island.

One of the services the company has extended as a means of strengthening internal relations is that of developing water wells. The scarcity of water in Saudi Arabia is legendary. Until the advent of modern methods the rarely-found desert wells were produced by camel and donkey power. Application of methods familiar to the engineers stationed in Saudi Arabia by the California Arabian company has developed numerous artesian water wells, one of the blessings for which Arabians are duly grateful.

Falcon training gives a dependable insight into the changelessness of the Arabian people, not only in their sports but in their national way of life. Falcons are trained to hunt so gradually, so carefully, that a virtual profession has grown up around the sport in Saudi Arabia. Stables are kept for the birds and they have their followers, or servants, very much as blooded horses have in the United States. Forbidding of expression though these birds are, the days and years of their training and care make them fiercely devoted to their owners.



TOM CONNALLY, U. S. senator from Texas, author of the hot oil law, which the Senate has voted to make permanent, was born in McLennan County, August 19, 1877. A.B., Baylor University; LL.B., University of Texas; member of twenty-seventh and twenty-eighth legislatures; prosecuting attorney, Falls County, 1906-1910; served in Sixty-fifth Congress; reelected through to the Seventieth Congress when he was elected to the U. S. Senate beginning March 4, 1929, and reelected to 1941.

STATE CAPITALS

ILLINOIS

ONE DOLLAR PER ACRE TAX on all Illinois land on which prospecting for oil, gas or other natural resources has been launched is provided in a bill introduced in the house of representatives on March 23 by Representative Leo D. Crowley of Peoria.

The measure, Crowley estimated, would bring in approximately $10,000,000 in revenue annually, all of which would go toward payment of old-age pensions.

PENNSYLVANIA

THE PROPOSED PENNSYLVANIA oil conservation bill was discussed at a meeting of a score of producers from all sections of the state in Oil City last Saturday and emerged unchanged from its original form. It will be presented in that form to the current session of the state legislature by Representative John H. McKinney. However, additions specifying salaries for members of the proposed commission and setting up a tax to finance operation of the act are expected to be made by the time the bill is presented before April 3, the last day on which the legislature will receive new bills.

TEXAS

IF THE TEXAS CORPORATION COMMISSION does not respond favorably to the widespread demand for a revocation of the April allowable production order, issued on March 22, there will be no Saturday shutdown in Texas fields in April. All three commissioners signed the order which would increase the daily allowable next month to about 1,513,000 bbls. per day. The Bureau of Mines estimate of demand is 1,412,700 bbls. Under the old order fields were shut in eight days a month, or four Saturdays and four Sundays. Under the new order the fields will be shut in five days in April, as there will be five Sundays in the month. The commission will meet on April 19 for consideration of future allowables. Because the Rodessa field lies in three states, that part of it lying in Texas will be permitted to produce every day of the month, as in Arkansas and Louisiana.

Commissioner Sadler said that East Texas was retained on a daily quotient of 2.32 per cent of the average hourly potential. The gross daily allowable will be 522,164 bbls., which Sadler estimated would be reduced to 425,000 to 450,000 bbls. daily average with the shutdowns.

April 1 allowables for other districts compared to the January allowable, both exclusive of reductions effected through shutdowns, are: Panhandle, 88,996 bbls.; North Texas, 117,654 and 94,184 bbls.; West Central Texas, 67,311 and 82,349 bbls.; West Texas, 265,654 and 244,582 bbls.; East Central Texas, 121,437 and 118,461 bbls.; Southwest Texas (lower Gulf Coast, Laredo and San Antonio districts), 336,902 and 317,647 bbls., and upper Gulf Coast, 285,200 and 271,735 bbls.

Subsequent to the commission issuing the order, which was widely criticized by many Texas operators, it was reported that at least four crude oil purchasers in Texas had requested the commission to reconsider its order. These companies declared that the extra days of production will put the allowable oil above the capacity of their pipe lines in several areas; that the increased allowables will give them more oil than their capacity to buy and dispose of, and that it will call for storage which they are not in a position to carry.

At the April 19 hearing it is expected that the commission will gather evidence on which to base revision of allocation among fields, an adjustment of which was not undertaken in the present order. Commissioner Jerry Sadler predicted the May 1 order would embody basic allowables, which have been advocated for some time, and equalizing what some consider to be inequalities between producing areas.

ON TUESDAY OF THIS WEEK Commissioner Thompson drew up the terms of an order which if passed will rescind the action of March 22 and continue production in April on the present basis, which calls for four Saturday and four Sunday shutdowns. Lon A. Smith, chairman of the commission, is quoted as saying that he was open minded in the matter and and if he found upon investigation the order should be changed he would vote to do so. Commissioner Sadler was in West Texas on Tuesday and could not be reached for a statement.

CHAIRMAN LON A. SMITH AND JERRY SADLER of the Texas Railroad Commission, while in Abilene, announced they were seeking support of the attorney-general's department in an antitrust investigation of the oil industry operating in Texas.

Messrs. Smith and Sadler sent this telegram to Attorney-General Gerald C. Mann:

"We think it imperative that an investigation of certain oil companies operating in Texas relative to price-fixing and possible violations of the antitrust act be had, and are requesting the assistance of the attorney-general's office in the matter of a prompt investigation."

LOUISIANA

LOUISIANA DEPARTMENT OF CONSERVATION at its meeting on March 23 established the allowable crude oil production of the state in April at 257,920 bbls. per day, of which 193,770 bbls. was allotted to the Gulf coastal district and 64,150 bbls. to the North Louisiana fields. Allowable increases were given to the Shreveport and Cotton Valley fields of North Louisiana, Shreveport's allotment being 3,850 bbls. per day and Cotton Valley 5,000 bbls. for the Holloway sand and 3,300 bbls. for Bodcaw sand wells. The total for the state is 3,700 bbls. per day higher than the March allowable.

JOHN E. FARRELL, Fort Worth, Tex., oil operator, said late last week that Governor Leche of Louisiana will issue an executive order this week bringing Louisiana into the Interstate Oil Compact Commission. Mr. Farrell said the announcement was made by Governor Leche following a conference between the governor, Mr. Farrell, Charles F. Roeser, president of the Independent Petroleum Association of America, and W. R. Boyd, executive vice president of the American Petroleum Institute, held at Mineral Wells, where Governor Leche was taking a short rest from his duties. It is understood that under Louisiana laws it will not be necessary for the legislature to approve the state's entrance into the compact, the governor's executive decree sufficing.

CALIFORNIA

A SPOKESMAN FOR THE U. S. NAVY and others urged passage by the California Legislature of a measure to give a state commission power to compel conservation of oil through proration of the state's output.

As the assembly committee on oil industries opened its hearing, Commander W. B. Greenwood, inspector of naval reserves in the Pacific, read a lengthy statement calling for regulation of the production of petroleum.

He set forth the Navy's view on the oil production situation in California and declared the Navy's approval of the measure, with suggested amendments.

Commander Greenwood was followed by George W. Holland, director of petroleum conservation for the U. S. Department of the Interior. The department, he said, was not appearing as for or against the measure, but looked on the bill as a conservation measure and desirable as such.

Appearing in support of the oil conservation bill, J. C. Coulter, secretary of an oil workers union at Long Beach, declared voluntary restriction of output has been proven a failure. He said the industry faces the prospects of stopping production completely for the two early summer months "throwing 20,000 employes in California out of work."

The proposed act, stated recently by its author, Assemblyman Maurice E. Atkinson to have administration approval, is patterned after the conservation code of New Mexico.

THE CENTRAL COMMITTEE of California Oil Producers is revising the California curtailment setup in order to adopt some of the recommendations contained in the report of the Fact Finding Committee and should have the new plan completed shortly and applied probably during the month of April. Crude oil producers failed to ratify the methods and plans of the Fact Finding Committee's report but many did approve the report in principle.

KANSAS

GOVERNOR PAYNE H. RATNER signed a bill on March 23 insuring participation of Kansas for another two years in the Interstate Oil Compact Commission.

The governor today signed a new proration law which limits the State Corporation Commission's authority in granting special allowables, and is expected to strengthen proration regulations in accordance with the governor's request for such an enactment in his message to the legislature.

The OIL AND GAS JOURNAL

PRODUCING REFINING NATURAL GASOLINE PIPE LINE

Published weekly by The Petroleum Publishing Company at Tulsa, Oklahoma

Still in the Woods

The slight improvement shown in refined market trends over the past month, while encouraging, cannot be interpreted as absolute proof that the industry is definitely out of the woods where it has been too long.

The action of the Texas Railroad Commission in lifting one of the two shutdowns is an indication of the danger in taking a too optimistic view of the improvement which appears to be under way

The testimony presented at the recent Texas hearing was conclusive evidence that the industry needs to make haste very slowly in any expansion of its operations.

Any study of the current statistical data covering recent operations, including those that indicate probable trends the coming year, will furnish plenty of proof as to what conditions actually are.

It is true that developments so far indicate that an all-time peak will be reached in gasoline demand this year. But gasoline stocks are only 6 per cent less than a year ago when they were far too high, as subsequent developments in 1938 clearly showed.

There is the further fact that the comparative improvements in gasoline stocks took place in the latter part of last year and, since the first of this year the additions to stocks have been greater than in the same period of 1938.

The fact that refiners have been able to reduce their heavy stocks of residual oil and gas oil 15,000,000 bbls. this year is also encouraging but it should be remembered that this liquidation represents excessive stocks which were placed in storage last year due to a decline in demand for heavy oil. Further liquidation is needed and the season of maximum fuel consumption is nearing the end.

In regard to crude oil, there has been no reduction in inventories since the first of the year. Recent reports have indicated that the supply exceeds current demand by at least 100,000 bbls. a day.

Due to the improvement in demand for products, particularly the heavy oils, there has been a tendency on the part of refiners to increase their crude runs to stills unduly. Recently these runs to stills have been around 150,000 bbls. daily greater than the same period last year, an expansion which is certainly not justified by current demand, inventory conditions and probable requirements over the remainder of the year.

So far as price recovery in refinery products is concerned the advances have been so small as to be of no general consequence. The improvement, such as it is, has not been substantial enough or long enough to justify any long-range assumptions. It is little more than a change in the direction of the wind; that is all.

The industry must remember in taking into consideration current conditions that it has to absorb past excesses. It must let the refining industry make up the prices it lost last year. The first factor in permanent improvement must be to permit the refining branch a price recovery that will offset last year's declines which ran from 15 to 30 per cent of the revenue from a barrel of oil.

Adding 150,000 bbls. or more daily to Texas production during April, to say the least, will not be helpful in bringing about this necessary development.

In taking responsibility for its action the commission needs to watch closely the effect of its order and rescind it promptly should the reaction of the industry within and outside Texas show that it is necessary.

Otherwise it may nullify in one stroke all the good that has been accomplished through operations in the producing divisions which have been fairly well balanced over the past six months.

Reich-Rumania Pact

(Continued from Page 47)

leum industry are estimated by Rumanian sources at approximately 13,236,000,000 lei (the lei being worth about three-fourths of 1 cent), divided approximately as follows: Rumanian 28 per cent, Anglo-Dutch 36 per cent, French 16 per cent, American 10 per cent. It is not yet known to what extent foreign investments in Rumania will be protected and whether foreign companies will be allowed to export their production without restriction.

The relationship of Rumania and the United States in Germany's petroleum trade is shown in the accompanying table based on preliminary German statistics of 1938 imports and including Austria from April 1 and Sudetenland from October 1. Figures are in thousands of barrels.

GERMAN PETROLEUM PRODUCTS

Product—	Total imports	From Rumania	From U. S.
Crude petroleum	5,148	158	1,469
Gasoline	11,535	2,746	2,242
Kerosene	172	67	...
Gas oil and motor oil	10,640	469	3,982
Lubricating and transformer oils	2,716	63	1,198
Fuel oil	2,702	133	...
Paraffin, crude	20,980	549	5,686
Petroleum asphalt	17,586	2,351	376

Czecho-Slovakian import figures for 1937 show total imports of crude of 1,635,000 bbls., of which Rumania supplied 1,247,000 bbls., the United States 182,000 bbls. and Colombia 216,000 bbls. Both the United States and Rumania supplied quantities of asphalt, paraffin wax, and minor petroleum products, with Rumania supplying a greater part of Czecho-Slovakian gasoline and kerosene and the United States supplying the bulk of the lubricating oils imported.

GERMAN CONSUMPTION AND PRODUCTION IN 1937

Products—	Produced from domestic materials: 000 tons	000 tons	Per cent total consumption
Gasoline	2,345	1,230	52.5
Gas oil (Diesel oil)	1,385	120	8.7
Kerosene	89	40	44.9
Fuel oil	791	320	40.5
Lubricants	540	140	25.9
Total	5,150	1,850	35.9

Hungary is now apparently completely within Germany's economic orbit from the standpoint of international trade and has greatly increased its production of petroleum. Production of crude in Hungary in 1937 was 2,214 metric tons, whereas production in 1938 was 42,797 tons and officials hope that if the increase can be maintained for another year the country can supply its entire needs of about 210,000 tons from its own wells.

The production of petroleum in Central Europe has been increasing in recent years, and semi-official figures translated into American barrels show the following production:

		Barrels
Germany	1937	3,170,000
Germany	1938	3,865,000
Czecho-Slovakia	1937	123,000
Czecho-Slovakia	1938	129,000
Poland	1937	3,708,000
Poland	1938	3,827,000
Austria	1937	221,000
Austria	1938	366,000
Hungary	1937	15,000
Hungary	1938	300,000
Rumania	1937	52,396,000
Rumania	1938	48,366,000

Germany in addition to attempting to expand its production of crude has been trying all possible substitutes. In 1937, according to official German statistics, German consumption of oil fuels totaled 5,150,000 tons of which 1,850,000 tons or 35.9 per cent were produced from domestic raw materials. In 1935 consumption was about 4,000,000 tons of which about 20 per cent was produced from domestic materials.

These estimates do not include local refining of imported crude which in 1936 accounted for about 8 per cent of requirements.

Production from the Hamburg field is increasing but it is considered unlikely extensive new fields will be discovered, and the deposits are being treated as emergency reserves and production is being used largely for manufacturing lubricants.

AMERICAN OIL EXPORTS TO GERMANY

	Quantity (1,000 bbls.)			Value ($1,000)		
	1936	1937	1938	1936	1537	1938
Petroleum, crude	1,176	1,430	1,287	1,476	2,004	1,847
Natural gasoline	15	63	52	32	165	193
Gasoline and other petroleum motor fuel	642	990	2,255	1,797	3,251	7,049
Naphtha, solvents, etc.	326	126	102	1,109	372	1
Illuminating oil	1	104	1	9	235	3
Gas oil and distillate fuel oil	2,577	2,690	3,953	3,568	4,438	6,251
Lubricating oil				10,390	10,035	9,010
Red and pale	595	592	540	3,661	3,440	2,754
Black	24	36	24	331	559	356
Cylinder	651	490	522	6,373	4,541	4,175
Lubricating greases	7,919	4,960	1,875	343	204	82
Paraffin wax, unrefined	5,125	13,681	2,488	147	448	57
Paraffin wax, refined	4,855	16,224	1,731	196	676	53
Asphalt and bitumen, natural, unmfd., tons of 2,240 lbs.	1,782	3,307	1,706	81	140	76

Tank Hazard to Be Demonstrated At Houston Oil Show

During the meetings sponsored by the General Safety Committee at the Oil-World Exposition in Houston, Tex., April 24 to 29, inclusive, a demonstration entitled "Men Who Go Down to Their Death in Tanks" will be a feature. This demonstration on April 28 will be given by S. E. Whiting, vice president and chief engineer of the Liberty Mutual Insurance Co. of Boston, Mass., who will be assisted by volunteer victims with emergency equipment loaned by the manufacturers.

S. E. Whiting

This will be a living demonstration of typical instances of the catastrophic hazards present at times in enclosed spaces. It will be presented in three scenes and one interlude. Illustrations will be given of both the technical and human factors involved and how to guard against them.

Rescue demonstration in model tank

Obituaries

DELMAR BARR SCHWAB, oil producer and mechanical engineer, died in Bradford, Pa., on March 20 from injuries received in an automobile accident in January.

GEORGE W. SNYDER, 71, Tulsa, retired oil driller, died March 24. He began his career in the oil business 30 years ago at Warren, Pa. He moved to Tulsa 22 years ago and retired three years ago.

C. P. HARRIS, Lamkin, Tex., oil man, was killed March 24 in an automobile collision near Vandalia, Ill.

ASAHEL C. SMYTHE, 93, for 54 years an oil producer in the Allegany fields of New York, died in Bolivar, N. Y., on March 22.

C. E. CARTER, 53, Oklahoma City, formerly a lease official of Indian Territory Illuminating Oil Co., died last week.

H. L. HAMAKER, 74, died recently in Los Angeles, Calif. He was the father of Rex G. Hamaker, vice president and sales manager of Reed Roller Bit Co.

J. C. TIBBETTS, drilling contractor, for years employed by the Royal Dutch-Shell interests in the East Indies, died in Bradford, Pa., on March 24.

SIR ERNEST MILLER, 60, retired oil company executive, died March 22 in England. He went to India in 1919 as manager of Ewart Ryrie & Co. of Karachi, joined Asiatic Petroleum Co. in 1921 and served them in Calcutta and Bombay. He was with Burma-Shell Co. since its formation in 1928. He was active in India until three or four years ago.

OREN EPHRIHAM RANDOLPH, 48, district superintendent of Sinclair Prairie Oil Co., died March 24 in McPherson, Kans. He joined the former Prairie Oil & Gas Co. at Jenks, Okla., in 1919 as a roustabout, was successively foreman at Shilder, Wetumka and Wewoka, Okla., becoming district superintendent at Wewoka before he was moved to Ranger, Tex. He went to McPherson as district superintendent in 1933.

Drilling Started on Test in Northeastern Missouri

Drilling operations in northeastern Missouri were started Tuesday with the spudding of Charles Delfeld and associates No. 1 E. T. Turner, NW NW Section 27-59-9w, wildcat in Shelby County. Location is 14 miles northeast of Shelbyville and 25 miles west of Palmyra, which is 12 miles northwest of Hannibal.

Ed Wright of Tulsa has the contract to drill to 2,500 feet to the granite or less if commercial oil or gas is found. Machine is being used.

Delmund Oil Co. of Cape Girardeau, Mo., has started a cable tool test in SE cor. Section 14-29-9e, Bollinger County, reported drilling below 1,100 feet.

F. G. Felden of Cape Girardeau, who visited oil offices in Houston, Tex., and Tulsa, last week; Baker Oil Co. of St. Louis, and other operators and companies are reported to have leased more than 150,000 acres, principally in Stoddard, Cape Girardeau, Bollinger and Mississippi counties. Mr. Felden said the lessees expected to complete plans soon for a deep test to be drilled with Arbuckle lime production as the goal.

J. W. Githens of Poplar Bluff, associated with operators of Texarkana, Ark.-Tex., and Glendale, Calif., has started leasing in Butler County, west of Stoddard County and north of Clay County, Arkansas. They plan to assemble between 20,000 and 30,000 acres and on completion of the block to start drilling, according to a report from Poplar Bluff.

The activity in southwestern Missouri centers

around Nevada, Vernon County, where a deep rotary test was started last summer but was not completed. Earl S. Welpton of Nevada, also a visitor in Tulsa last week, reported landowners in that district had placed leases on about 30,000 acres in six blocks.

The activity continues in the Forest City basin, northwestern Missouri, although leasing now consists largely in completing blocks and proving titles. The well being drilled near Mound City, Holt County, by J. H. Everitt and associates at No. 1 Spring, SW SW SE Section 30-62-38w, first test started in the basin in Missouri, was reported making hole below 1,000 feet, but operators were not giving information.

Richberg Will Confer With Companies on Mexico

NEW YORK, Mar. 27.—The dispute between American and British oil companies whose properties were confiscated by Mexico appears no nearer a solution. Donald R. Richberg, representative of the companies, left Mexico City March 23 after a series of conferences with President Cardenas, was neither optimistic nor pessimistic about chances for a settlement.

Earlier in the week, Mr. Richberg attempted to correct the impression broadcast in Mexico that a solution was near. President Cardenas addressing 40,000 Mexicans implied the controversy would be terminated soon. Mr. Richberg said President Cardenas apparently based his implications on a plan proposed by him which would leave ownership, management and control in hands of the government. Mr. Richberg had proposed the companies receive sufficient managerial control to guarantee past and future investments. Details of President Cardenas' plan will be discussed with executives of the companies.

THE MARKETS*

CRUDE OIL: *Small buyers advanced their price schedules in North Texas-Red River, Oklahoma and Shreveport areas. Major buyer reduced its posted schedule for the high-gravity crudes in West Texas.*

REFINERY: *Gasolines not as strong in Gulf Coast, East Coast and California areas as in interior refining centers, where prices have strengthened. Fuel oil distillates weak at most points. Wax generally strong.*

TANK-WAGON AND POSTED DEALER: *Gasoline prices reduced in New York City and several up-state points in New York State. Advances in gasoline and kerosene materialized at several subnormal points in the Middle West, Rocky Mountain and southeastern marketing territories.*

FINANCIAL: *Oil stocks inactive and move within narrow ranges. Average of 30 representative stocks for week ending March 25: High, 27.31; low, 26.15; close, 26.64. Week ending March 18: High, 28.53; low, 26.73; close, 26.86.*

ANNUAL REPORTS†

	Net income	Earned per share
Skelly Oil Co.:		
1938	$2,650,055	$2.27
1937	6,488,346	6.07
Superior Oil:		
1938	332,579	0.24
1937	446,246	0.32
Standard Oil of Nebraska:		
1938	‡111,731	‡0.69
1937	‡96,125	‡0.58
Standard Oil of Ohio:		
1938	1,964,605	1.81
1937	3,362,960	3.67
Texas Pacific Coal & Oil:		
1938	1,035,599	1.17
1937	983,303	1.11
Derby Oil & Refining:		
1938	‡164,358	‡0.91
1937	426,823	1.34
H. F. Wilcox Oil & Gas:		
1938	254,057	0.50
1937	127,282	0.25
Sunray Oil Corp.:		
1938	569,314	0.23
1937	950,850	0.42
National Supply Co.:		
1938	1,283,767	‡0.79
1937	7,857,500	4.90
Continental Oil:		
1938	5,139,755	1.10
1937	13,948,459	2.98
Standard of Indiana:		
1938	27,770,000	1.82
1937	55,950,784	3.66
Union Oil:		
1938	6,862,758	1.47
1937	12,061,332	2.58

*Additional information in market section. †Furnished by Carl H. Pforzheimer, New York. ‡Deficit.

N. P. A. Program For Annual Meeting at Cleveland

The program for the semiannual meeting of the National Petroleum Association at the Hotel Cleveland, Cleveland, Ohio, April 12-14, follows:

Wednesday, April 12

2 p.m. Western Pennsylvania Refiners Traffic Association, Parlor 34.

8 p.m. Executive committee, Department of Fire and Accident Prevention, Parlor 24.

Thursday, April 13

9:30 a.m. Board of trustees, Parlor 5-C.

Department of Manufacture, Parlor 26-28. "New Catalytic Processes," by W. W. Gary, M. W. Kellogg Co.

Department of Taxation, Parlor 34-36. "Administrative Provisions State Social Security Acts," by John F. McFarland, Sun Oil Co.

Department of Traffic and Transportation, Parlor 34-36. "Proposed Transportation Legislation Now Before Congress," by John B. Keeler, chairman legislative committee, National Industrial Traffic League.

2 p.m. General session. Address of welcome, Charles L. Suhr, president.

"The Province of the Federal Trade Commission in the Field of Business Practices," by Robert E. Freer, chairman, Federal Trade Commission.

The report and recommendations of the National Resources Committee:

"The Federal Viewpoint," by John W. Frey, associate director, Petroleum Conservation Division, Department of the Interior, member Energy Resources Committee.

"A State's Viewpoint," by Ernest O. Thompson, chairman, Interstate Oil Compact Commission, member Railroad Commission of Texas.

Discussion panel of the two viewpoints: H. T. Ashton, W. T. Holliday, E. C. Breene, B. L. Majewski. Other names to be added.

6:30 p.m. Fellowship supper in the Cleveland Hotel ballroom.

Entertainment committee: H. M. Carruth and A. L. Bailey, Canfield Oil Co.; C. S. Smith and H. W. Kuegler, National Refining Co.; A. M. Maxwell and M. R. Bower, Standard Oil Co. of Ohio.

Friday, April 14

9:30 a.m. Breakfast session. Harry A. Logan, second vice president of National Petroleum Association, presiding.

"American Aviation—Present and Future," by Col. Edgar S. Gorrell, president, Air Transport Association of America.

"The Problems of Small Enterprises in the Oil Industry," by Paul G. Blazer, president, Ashland Refining Co.

"Expropriation of Oil Properties in Mexico." Speaker to be announced.

Refining Problem Study Considered by I.P.A.A.

HOUSTON, Tex., March 27.—That the action of the Texas Railroad Commission in lifting Saturday shutdown of production is an unfavorable and distinctly discouraging move was the opinion of speakers at a luncheon of the Southeast district of the Independent Petroleum Association of America here today.

Principal speakers were Hugh M. Stalcup, Tulsa, vice president of Skelly Oil Co. and member of the executive committee of the association, and Harold B. Fell, president of Simpson-Fell Oil Co. and executive vice president of the association, Ardmore, Okla. Pat R. Rutherford, vice president for the Southeast district, presided.

Mr. Stalcup reviewed the work of the special study committee of 36. The proposal of refining control under the interstate oil compact was said to be illogical and impractical under existing laws.

Another subcommittee was appointed to study three points: (1) To find why the code of fair marketing practice for the industry was pigeon-holed; (2) ascertain the cost and time of making a careful and thorough study of the problems of the refining and marketing end by the Brookings Institute, Wharton school of finance, and the Harvard school of business administration; (3) ascertain the legality of integrated companies making annual reports by departments to the Securities Exchange Commission.

Another subcommittee was named to study rates and tariffs in connection with the transportation of crude.

"Some progress in working out a number of sore spots, abnormal price situations, state allowables and other problems has been definitely accomplished and some degree of optimism generated," Mr. Stalcup said. "But announcement of an increase of about 198,000 bbls. in Texas production is distinctly discouraging."

Permian Basin A.P.I. Chapter To Hold Meeting in April

MIDLAND, Tex.—The spring meeting of the Permian basin chapter of A.P.I., Division of Production, will be held on April 22 at the Odessa High School Auditorium. J. P. Ruckman, Humble Oil & Refining Co., Midland, is chairman of the program committee, assisted by Luther Neal, vice president of Landreth Production Corp., Odessa.

Recent officers elected to head the Permian basin chapter are J. W. Jordan, chairman, Sinclair Prairie Oil Co., Midland; J. P. Ruckman, first vice chairman, Humble Oil & Refining Co., Midland; H. L. Johnston, second vice chairman, Continental Oil Co., Hobbs; L. A. Neal, third vice chairman, Landreth Production Corp., Odessa; J. E. Wooten, fourth vice chairman, Stanolind Oil & Gas Co., Wink.

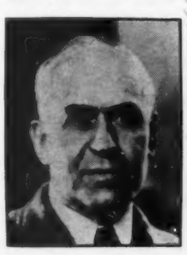
Advisory committee: C. R. Allen, Illinois Oil Co., Kermit; J. V. Dunlavey, Skelly Oil Co., Hobbs; R. T. Germany, Magnolia Petroleum Co., Odessa; J. T. Hildreth, General Crude Oil Co., Wink; J. H. Rankin, Sinclair Prairie Oil Co., Midland; T. J. Sweeney, Sun Oil Co., Odessa; Glenn Bish, Ohio Oil Co., Hobbs; W. E. Cunningham, Oil Well Drilling Co., Hobbs; W. T. Doherty, independent, Midland; Earl Griffin, Phillips Petroleum Co., Odessa; G. A. Poole, Gulf Oil Corp., Odessa; K. L. Sappington, independent, Midland.

Mid-Continent Strike No Nearer Settlement

The strike by the Oil Workers Union against Mid-Continent Petroleum Corp. continues. The union insists the first condition of settlement is restoration of all strikers to their jobs with full seniority privileges. The company insists employment of strikers guilty of illegal acts cannot be considered.

Scudder Addresses Petroleum Accountants of Oklahoma

Lawrence W. Scudder, economist, statistician, and accountant of Chicago, will be the principal speaker at the monthly dinner meeting of the Petroleum Accountants Society of Oklahoma, in the Mayo Hotel, Tulsa, March 30. His topic is "Taxing Our Way to Prosperity."



Lawrence W. Scudder

Mr. Scudder is chairman of the board of the American Academy of Accountancy.

The Petroleum Accountants Society of Oklahoma represents a membership of 150, comprised chiefly of financial officers, comptrollers, auditors and accountants holding supervisory positions in 46 oil companies.

Refinery Expansion

Opinion Is Filed in Gray Process Case

In an opinion handed down by Federal Judge James C. Wilson and filed in Amarillo, Tex., on March 24, the clay treating patents of the Gray Processes Corp. were held valid and infringed by the Danciger Oil & Refineries, Inc., at its Pampa, Tex., refinery.

The process was first put into commercial use by Barnsdall Refining Co. in 1924. After the successful operation of the Barnsdall unit the process was installed under license from the Gray Processes Corp. in a number of large and small refineries. At the present time more than 175,000 bbls. of gasoline per day are being treated by Gray licensees.

Arkansas Fuel Oil Plant Operates New Units

Initial runs for the new cracking and polymerization units of the Arkansas Fuel Oil Co. are slated this week. The units, recently completed at the Bossier City refinery, comprise a new cracking and reforming unit with a charging capacity of 2,000 bbls., and a thermal polymerization unit designed for a yield of between 11,000 and 20,000 bbls. of poly distillate daily, dependent on the type of charge. The new plants will replace outmoded equipment at the refinery, and no increase in crude capacity results from the new project.

New Refinery to Be Built At Mount Vernon, Ind.

GLADEWATER, Tex.—Formation of the Indiana Oil & Refining Co. to build a refinery at Mount Vernon, Ind., was announced here Saturday. The company has purchased the old Trinity Refining Co. plant here and moved it to Mount Vernon where it will be modernized and possibly a cracking unit added. The Trinity plant had a capacity of 3,000 bbls. daily; it was shut down for the past 18 months. Lon Huddleston is president of the new organization, J. H. Gwinn vice president and E. J. Bartels, formerly of Overton, Tex., is secretary.

Eagle Plans to Install Dubbs Cracking Unit

Eagle Oil & Refining Co. of Santa Fe Springs, Calif., has just signed a license agreement with Universal Oil Products Co. for the latter to install Dubbs cracking equipment in Eagle's refinery. A survey now is being made to see how the best features of the present Santa Fe Springs plant can be utilized and combined with the new units and equipment that will be necessary to increase efficiency and capacity. At present this plant has a proved charging capacity of about 3,000 bbls. daily.

Fourth Centralia Refinery Placed in Operation

The Advance Refining Co. plant in Centralia, Ill., has been placed in operation, reports Maynard Taxman, secretary-treasurer.

The company purchased the plant, formerly operated by the Power Oil & Refining Co., for $21,500 at a federal court sale.

Equipment has been revamped, but no major changes have been made in the plant, Taxman said. It has a capacity for running 2,000 bbls. of crude.

J. J. Taxman is president of the company and Milo W. Taxman is sales manager. J. J. and Maynard Taxman formerly operated the Taxman Refining Co. at Wichita Falls, Tex. Milo Taxman was formerly connected with the Atlas Petroleum Co. of Chicago.

Refinery at Spokane Recently Completed

Furnishing an outlet for 2,000 bbls. of Cut Bank crude daily, throughout the year, the plant of Inland Empire Refineries, Inc., at Spokane, is now operating. Cut Bank producers have made price concessions that justified the construction of two plants: one at Spokane and the other at Pocatello, Idaho. The latter plant provides a market for 1,000 bbls. per day and during the present year this is to be stepped up to 1,500 bbls. per day, it is understood.

Crude for the Spokane plant is being furnished by Glacier Production Co. Crude for the Pocatello plant is being furnished by Crumley & Frary, of Cut Bank, Robert Wilkinson of Butte and Castle & Pardee of Cut Bank.

Cracking furnaces, designed for 70 per cent gasoline recovery from crude oil, will be put into operation this week at the Inland Empire plant at Spokane.

The flow of crude through the plant began recently after test runs had been made over a period of several weeks.

Winkler-Kock Construction Co., general contractors, completed their work this month.

W.P.R.A. Directors Plan Meeting on Activities

The new board of directors of the Western Petroleum Refiners Association which was announced following the annual meeting held in San Antonio last week included several prominent plant superintendents and managers The association plans to stress technical developments in refining and committee appointments will be announced shortly which will direct this program.

L. B. Simmons, newly elected president of the association, will call a directors meeting during April to further outline the activities for the coming year. A picture and sketch of Mr. Simmons appears on page 229 of this issue. The following have been elected to the board of directors:

H. T. Ashton, Socony-Vacuum Oil Co. (Lubrite Division); A. Danciger, Danciger Oil & Refineries, Inc.; H. W. Camp, Cities Service Oil Co.; Sheldon Clark, Sinclair Refining Co.; O. L. Cordell, Barnsdall Refining Corp.; B. P. Crittenden, Rodessa Oil & Refining Co.; A. L. Derby, Derby Oil Co.; Alexander Fraser, Shell Petroleum Corp.; D. P. Hamilton, Root Petroleum Co.; R. R. Irwin, Socony-Vacuum Oil Co. (White Eagle Division); R. E. Luton, Ohio Oil Co.; W. E. Moody, Deep Rock Oil Corp.; F. L. Martin, Sunray Oil Co.; G. G. Oberfell, Phillips Petroleum Co.; I. A. O'Shaughnessy, Globe Oil & Refining Co.; L. H. Prichard, Anderson-Prichard Oil Corp.; W. F. Sims, Panhandle Refining Co.; W. G. Skelly, Skelly Oil Co.; J. W. Warner, Tide Water Associated Oil Co.; C. B. Watson, Pure Oil Co.; J. A. Welch, Arkansas Fuel Oil Co.

Ex-officio directors (former presidents): C. M. Boggs and Roy B. Jones.

Cracking Development Conference Covers Wide Variety of Subjects

The tenth meeting of the Cracking Development Conference was held under the auspices of Gasoline Products Co., Inc. at the Stevens Hotel in Chicago on March 14-17, inclusive. The attendance of approximately 75 men from the member companies was the largest since the beginning of the conference.

An outstanding subject of discussion was the operation of the combination delayed coking and cracking systems now being offered for license by Gasoline Products Co., Inc. Among other important subjects were: Fundamental Correlations on the Cracking of Gas Oils and Residual Stocks, Reforming of Cracked and Virgin Naphthas, Viscosity Breaking, Furnace Performance, Desalting of Refinery Charging Stocks, Cracking Fractionation and Its Effects, Control of Coke Formation, and the Commercial Operation of Numerous Types of Cracking Units Including Recently Built and Remodeled Ones.

Most of the four-day period was taken up with the discussion and analysis of the papers. Inspection trips were made by the group to the new 25,000-bbl. per day delayed coking and cracking unit of Standard Oil Co. (Indiana) at Whiting, Ind., and to the Texas Co. refinery at Lockport, Ill. An interesting feature of the sessions on furnaces and combustion was the showing of color motion picture films of the performance of gas and fuel oil burners in actual operation within furnaces. These films, taken by M. W. Kellogg Co. in its study of this problem, revealed flame characteristics and other combustion features not discernible by the naked eye.

Walter G. Whitman, professor of chemical engineering at M.I.T., presided. The acting representatives were J. K. Roberts for Standard Oil Co. (Indiana), P. E. Kuhl for Standard Oil Development Co., C. W. Watson for Texas Co., W. W. Gary for M. W. Kellogg Co., and George Armistead, Jr., of Process Management Co., secretary of the conference.

Allied Oil Co. to Build Tankage at Toledo

TOLEDO, Ohio.—A building permit has been taken in the name of A. C. Byrers, head of Allied Oil Co., Cleveland, for construction of an oil storage tank with 55,000 bbls. capacity on the east side of the Maumee River. The company will operate a fleet of tankers out of Toledo to handle crude oil which will be stored.

Construction Started for New Kansas Refinery

Work has begun on the construction of an oil refinery south of the city limits of Stockton, Kans. The plant will handle oil from independently owned wells in Rooks and Ellis counties. Kenneth Nill, of Russell, will be superintendent of the new refinery which will handle approximately 500 bbls. daily. Mr. Nill said that most of the production would be gasoline and kerosene for tractor and farm fuel uses. The crude oil will be brought to the refinery in tank trucks and the finished products will be sold through independent filling stations.

Gasoline Sales Increase In California

SACRAMENTO, Calif.—Gasoline sales continued to increase last month according to the tax report for February, issued by the state Board of Equalization.

On the basis of motor vehicle fuel distribution for the month, sales amounted to 123,583,802 gallons on which a tax of $3,707,514.06 was levied. This represented a gain of 4 per cent over the tax of $3,564,705.33 levied for the same month of the previous year.

New Montana Refinery

The Glacier Production Co., subsidiary of the Montana Power Co., has begun preliminary work on its 1,500-bbl. refinery at Cut Bank, Mont., at the site of its absorption plant. The work consists of building a tool house, laying water lines, and excavating foundations for pump house and other structures. The plant is being fabricated and will be shipped as soon as ready and it is planned to have it in operation by the time the summer peak demand for gasoline is under way. Temporarily plans of the Producers Refining Co. and Socony-Vacuum Oil Co. for a refinery at Shelby are held in abeyance while an agreement for the processing of their oil at the Cut Bank plant is being negotiated.

Natural Gasoline

Warren Building $300,000 Gulf Coast Plant

Warren Petroleum Corp., Tulsa, has completed plans and started construction of a $300,000 natural gasoline plant in the Fairbanks field, 10 miles northwest of Houston, Tex. It is estimated the plant will be completed by May 15 or June 1.

Initial production will be 12,000 gallons a day, which will be increased to 25,000 gallons daily with the gradual addition of new well connections to the plant.

The company is constructing the plant to facilitate its exports from the Gulf Coast.

Pipe Line Activity

Gas line through West Texas sands

Kentucky Natural Acquires Universal Gas Co.

OWENSBORO, Ky.—Kentucky Natural Gas Corp. of Owensboro has acquired Universal Gas Co. of Terre Haute, through which gas from Kentucky has been supplied to eight Indiana and seven Illinois communities.

William T. Stevenson, secretary-treasurer of Kentucky National Gas Co., said that J. H. Hillman of Pittsburgh, president of Kentucky Natural Gas; W. J. Hichey of Owensboro, vice president, and himself would hold the same offices in Universal Gas. The Universal Gas Co. lines connect with lines of Central Illinois Public Service Co. and Public Service Co. of Indiana to serve Greencastle, Martinsville, Bloomington, Bedford, Mitchell, Franklin, Columbus and Seymour in Indiana, and Paris, Mattoon, Effingham, Kansas, Sigel, Neoga and Charleston in Illinois.

Humble Rerouting Pipe Line In West Central Texas

FORT WORTH, Tex.—Humble Pipe Line Co. has started construction of a 25-mile gathering line from southern Throckmorton County to its Matthews Ranch station near Albany in Shackelford County. At that point crude from the Woodson field and other Throckmorton fields, and from Young and Stephens counties, will be rerouted into its main line at Meyer and thence into the trunk line to the Gulf Coast.

The company is taking up about 40 miles of 4-inch line in Throckmorton, Young and northwest Stephens counties and oil that has been piped southeast out of those areas will be rerouted through the new 4-inch line. The new route will provide a greater gravity drive as well as saving considerable line mileage.

North Permian Basin Line To Hobbs Being Rushed

MIDLAND, Tex.—The new 6-inch line being constructed by Aloco Oil Co. from its wells in the Wasson pool of Yoakum County to Hobbs, N. M., is expected to be placed in operation within three weeks. Six-inch pipe is being strung along the 30-mile right of way from Aloco's 55,000-bbl. storage tank in the Denver area to Atlantic Pipe Line Co. main line at Hobbs, the latter having contracted to purchase a maximum of 5,000 bbls. daily for two years. The gathering system for Aloco's 35 wells in the Wasson and Bennett fields has been completed.

Completion of the line will give the fields a much needed additional outlet. Humble Pipe Line Co., at present the only line serving the fields, due to limited capacity, is taking only 72 per cent of the allowable and is understood not to be connecting to new wells. Shell Pipe Line Co. had planned a third line to Hobbs, but has not announced whether it will be laid.

Detroit Allowed to Intervene In Columbia Gas Case

WASHINGTON, D. C.—Announcement by Attorney General Murphy that the Department of Justice has agreed to intervention by the city of Detroit in the Government's antitrust action against Columbia Gas & Electric Corp. indicates a new attitude in the Columbia Gas consent decree situation.

In January 1936, the department obtained a consent decree against Columbia Gas enjoining the company from dominating Panhandle Eastern Pipe Line Co. or interfering with its freedom of action in the sale of natural gas in interstate commerce. Recently the department implemented the consent decree by filing a petition in the courts requesting definite action by Columbia Gas looking toward either a divestment of its affiliation with Columbia Oil & Gasoline Corp., which owns half of Panhandle Eastern, or disposition of Panhandle common stock by Columbia Oil. Missouri-Kansas Pipe Line Co., owner of the remaining half of Panhandle Eastern common stock, recently petitioned the courts for leave to intervene but was opposed by the Department of Justice.

Ask Kansas Pipe Line Co. For Financial Status

WASHINGTON, D. C.—Federal Power Commission attorneys have demanded that the Kansas Pipe Line & Gas Co. prove it could finance the $25,000,000 pipe line it proposes to build from the Hugoton, Kans., gas field to Minnesota.

The demand was made at the beginning of the hearings on the company's request for authority to build a line across Nebraska, South Dakota and North Dakota.

Natural Gas News

Gas Revenues in January Up 4.3 Per Cent

Revenues of manufactured and natural gas utilities totaled $84,013,100 in January, an increase of 4.3 per cent from $80,559,400 reported for January, 1938. Revenues of the manufactured gas industry aggregated $33,734,200, an increase of 2.6 per cent. The natural gas utilities reported revenues of $50,278,900, or 5.5 per cent above January, 1938.

Sales of natural gas for domestic purposes increased 5.7 per cent. The quantity of natural gas used for generating electric energy was 12.4 per cent above the previous year. Natural gas sales for other industrial purposes registered a gain of 3.6 per cent.

Management, Technique and Markets, Gas Topics

For its own show-within-a-show during the American Gas Association Natural Gas convention, May 8-11, in Tulsa, the Industrial Gas Section has arranged a one-day program for subjects which can be classed as "major 1939 interests" to all industrial gas sales people in natural gas areas. All three sessions—morning, luncheon, and afternoon—will be held Monday, May 8, the day before the general sessions.

George Rowland, Cities Service Gas Co., Bartlesville, Okla., will lead off on "Possibilities and Effects of Oil Industry Loads Upon Gas Company Earnings." M. A. Reagan, United Gas Pipe Line Co., Wichita Falls, Tex., and Frank S. Kelly, Arkansas Louisiana Gas Co., Shreveport, La., will follow with discussions in the light of their experiences.

Getting down to specific markets for industrial gas, Charles R. Bellamy, chief engineer, Columbia Gas & Electric Corp., New York, 1939 chairman of the Industrial Gas Section, Industrial and Commercial Air Conditioning Committee, will advise on "Reaching the Summer Air Conditioning Market Through the 1938-39 Developments in Gas Equipment." O. A. Kinzer, Lone Star Gas Co., Dallas; L. O. Vogelsang, San Antonio Public Service Co., San Antonio, and Carl H. Dean, Oklahoma Natural Gas Co., Tulsa, will also speak.

The gas engine market will be analyzed by D. W. Reeves, Oklahoma Natural Gas Co., Tulsa, 1939 chairman of the Industrial Section, Gas Engine Power Committee. Both the "Economics and Sales Possibilities of Gas Engine Loads" will be covered. Manley H. Clark, Southern Counties Gas Co., Los Angeles, Calif., will lead the discussion.

During the luncheon session Walter C. Beckjord, vice president, Columbia Gas & Electric Corp., New York, will interpret how "Management Views the Growing Industrial Gas Load."

The afternoon will be devoted to industrial sales techniques. "Approaching Gas Sales From a Salesman's Standpoint Rather Than an Engineer's" will be discussed by Charles F. Henness, manager of industrial gas sales, Public Service Co. of Northern Illinois, Chicago, assisted by F. Marion Cheif, Public Service Co. of Colorado, Denver; Karl Emmerling, East Ohio Gas Co., Cleveland, Ohio, and Edwin Snook, Amarillo Gas Co., Amarillo, Tex.

Frank H. Trembly, Jr., Philadelphia Gas Works Co., chairman of the A.G.A. Industrial Gas Section, will conclude the session with an evaluation of the "Importance of the Industrial Gas Section's Function to the Industry."

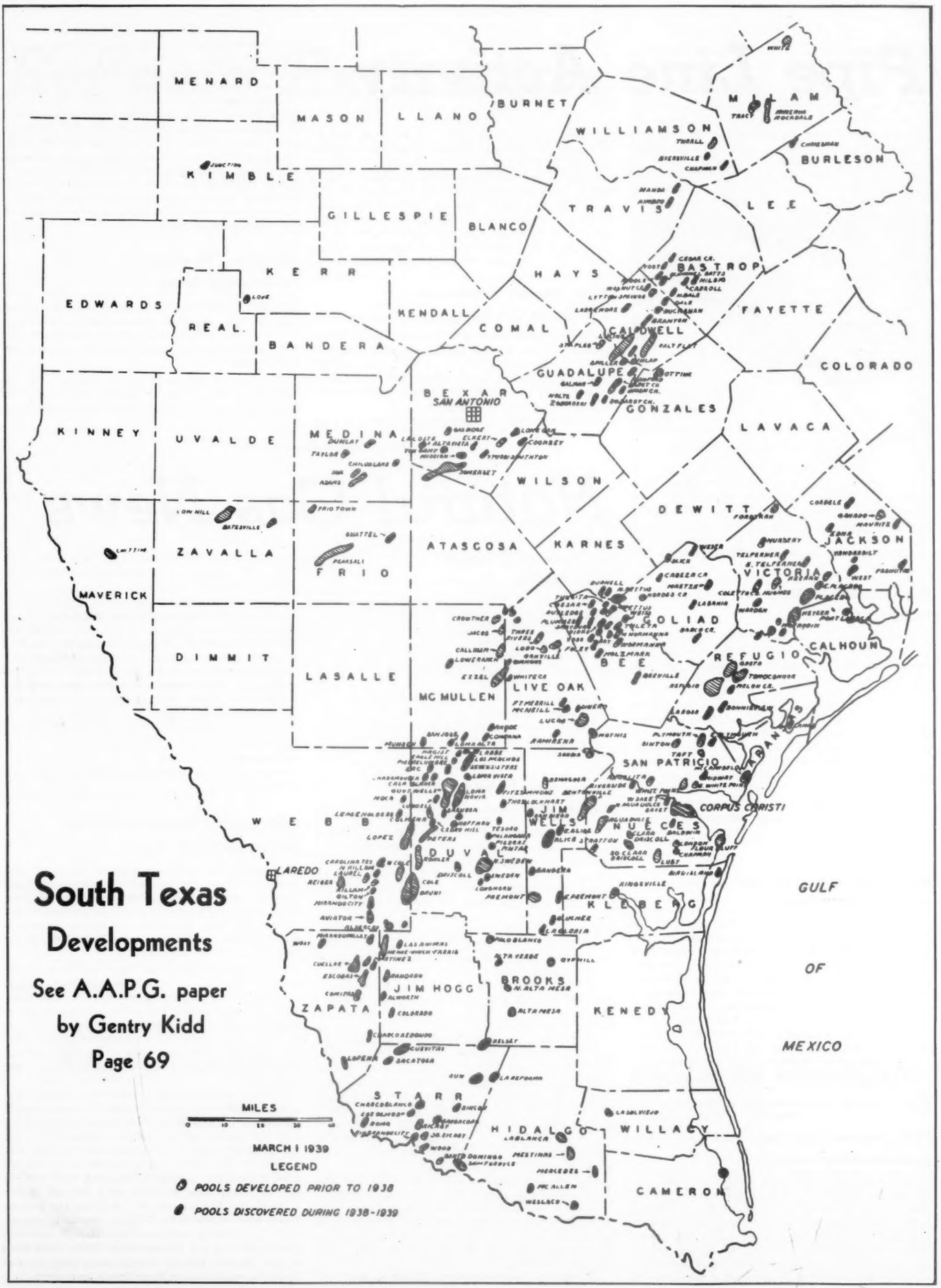
Pennsylvania Commission Appeals For Federal Aid on Rates

WASHINGTON, D. C.—A Federal Trade Commission investigation of wholesale rates for natural gas affecting 434,000 Pennsylvania consumers has been asked by the Pennsylvania Public Utility Commission which asked leave to intervene in an investigation of rates charged by the New York State Natural Gas Corp. The petitions included:

A complaint against the wholesale rates of the Hope Natural Gas Co. for natural gas sold to Peoples Natural Gas Co., Fayette County Gas Co., and Manufacturers Light & Heat Co. which sell natural gas at retail to 253,000 consumers.

A complaint against the wholesale rates of the Pittsburgh & West Virginia Gas Co. to Equitable Gas Co., which supplies natural gas to 181,000 Pennsylvania consumers.

The complaints ask that the Federal Power Commission investigate the price charged by the defendants for natural gas sold at the Pennsylvania-West Virginia state line and fix the just, fair and reasonable rate for the same. In addition the petitions ask that the Federal Power Commission make a determination that the Hope Natural Gas Co. and Pittsburgh & West Virginia Gas Co., since June 21, 1938, have violated Section 4 (a) of the Natural Gas Act, and that the Federal Power Commission make available records it may acquire to aid the Pennsylvania commission in determining the fairness and reasonableness of the retail rates of the Peoples, Fayette County, Manufacturers, and Equitable companies to Pennsylvania consumers.


South Texas
Developments
See A.A.P.G. paper
by Gentry Kidd
Page 69
MENARD
MASON
LLANO
BURNET
WILLIAMSON
MILAM
BURLESON
KIMBLE
GILLESPIE
BLANCO
TRAVIS
LEE
BASTROP
KERR
HAYS
EDWARDS
REAL
KENDALL
COMAL
CALDWELL
FAYETTE
BANDERA
GUADALUPE
COLORADO
BEXAR
SAN ANTONIO
GONZALES
KINNEY
UVALDE
MEDINA
LAVACA
WILSON
DEWITT
JACKSON
ZAVALLA
ATASCOSA
KARNES
VICTORIA
MAVERICK
FRIO
GOLIAD
REFUGIO
CALHOUN
DIMMIT
LASALLE
BEE
MC MULLEN
LIVE OAK
SAN PATRICIO
ARANSAS
CORPUS CHRISTI
WEBB
JIM WELLS
NUECES
DUVAL
LAREDO
KLEBERG
GULF
OF
MEXICO
JIM HOGG
BROOKS
ZAPATA
KENEDY
STARR
HIDALGO
WILLACY
CAMERON
MILES
MARCH 1 1939
LEGEND
POOLS DEVELOPED PRIOR TO 1938
POOLS DISCOVERED DURING 1938-1939

Oil Men Agree...

"USE UNAFLO *for* TOUGH CEMENTING JOBS"

Read what engineers, drilling contractors and division superintendent say:

Division Engineer, major oil company (Okla. City). "Since we have Unaflo, figuratively speaking, we go about these tough work-over jobs whistling."

Division Field Engineer, major oil company (Houston). "What's good for the toughest job sure can't be bad for an easy job. In South Louisiana we use Unaflo extensively. Our superintendent wants to keep out of a jam."

Chief Engineer, major oil company (Houston). Unaflo is written in our orders to field men for tough jobs, on the basis of our own laboratory tests."

Division Development Engineer, major oil company (Houston). "After getting in trouble on two deep wells, we changed to Unaflo. We decided that if we were going to pay for a safety factor we should have all we could get."

District Superintendent, major oil company (East Texas). "Over 60 repair jobs with Unaflo. Average slurry weight 17.3 pounds per gallon. Have been 'down' as long as 4½ hours and have never been caught. Find that by reducing water ratio from 40% to 30% we can build squeeze pressures at will. Keep making Unaflo as it now is."

SAVE MONEY by using Unaflo first on your next job. Universal Atlas Cement Co. (United States Steel Corporation Subsidiary), Amicable Bldg., Waco, Texas; Kansas City; Tulsa; Oklahoma City.

Drilling Contractor (Corpus Christi). "Unaflo is taking hold here. The men in the field like it."

Field Engineer, a cementing company. "About 75% of these squeeze jobs that I make use Unaflo."

Division Superintendent, major oil company (Corpus Christi). "You can run Unaflo heavy and avoid trouble. I ran Unaflo 16.2 pounds per gallon on squeeze job with excellent results."

REASONS BACK OF WHAT THEY SAY ABOVE

1. Gives you more time to get it down.
2. Mixes and places easily with 35 per cent water, thus eliminating need for excess water, a big menace to good cementing.
3. Remains fluid under high temperatures.
4. Easier to regulate viscosity at tub.
5. Hardens thoroughly with high density after it is placed.
6. Not stiffened by mud contamination.
7. Not affected by salt water contamination.
8. Hardens satisfactorily in sulphate water.
9. Meets the requirements for sulphate resistance.
10. Makes squeeze and plug-back jobs easier, surer, more successful.
11. Unaflo permits operator to control cement rather than being controlled by it.
12. Unaflo has been proved by oil industry by consistently "coming through in the clinches" ever since its introduction.

A CEMENT FOR EVERY OIL COMPANY USE AT OIL WELL, REFINERY, AND FILLING STATION

ATLAS PORTLAND CEMENT
For *surface* work and for cementing *surface* casing. Unaflo cement is recommended for *deep* well work.

LUMNITE CEMENT
Is used in oil refineries for making refractory, insulating and heat-resistant concrete linings in still furnace walls, bottoms, roofs, foundations, ducts, flues and stack linings; tube sheet insulation. Lumnite cement makes corrosion-resistant concrete and mortar lining in distillation and cracking units; rerun stills; absorption systems; chemical treating and Ethyl plants.

ATLAS WHITE
The cement that is pure *white* and non-staining. Exceeds specification requirements for portland cement strength. Ideal for ornamental work in connection with service station construction and repair.

OG-U-9

Universal Atlas Cements

INTERNATIONAL

Venezuela Output During February Little Changed

Venezuela crude oil production in February was maintained at approximately the same rate that prevailed in January, but was higher by 39,036 bbls. in daily average than for the same month last year. Total production for February is estimated at 14,665,968 bbls., a daily average of 523,783 bbls. The daily average rate of production in January was 523,941 bbls., but in February, 1938, was only 484,747 bbls. In the following tabulation by fields, the 1939 figures are not comparable in all instances with those shown for the same month in 1938 since Lago Petroleum Corp., and Creole reports its Lake Maracaibo production currently in a lump sum rather than by fields. Therefore, all Lake Maracaibo production by Lago and that accruing to Creole through operating contracts is arbitrarily assigned to Lagunillas.

Combined production of Lake Maracaibo fields last month was 10,825,835 bbls., compared to 9,744,058 bbls. for the same month in 1938. Part of the increase in Lake production this year is due to the Bachaquero field which did not appear in the shipping field reports until last last year. Remainder of the increase is in the Tia Juana field. Lago Petroleum Corp. again became the largest individual producer in Venezuela last month displacing Venezuela Oil Concessions which headed the list in January. However, Venezuela Oil Concessions, subsidiary of the Royal Dutch-Shell group, has increased its output by nearly 1,000,000 bbls. per month since this time in 1938. Lago, Standard of Venezuela and Mene Grande Oil Co. (Gulf) have also increased their output over 1938 but by more modest totals than in the case of Venezuela Oil Concessions. The Temblador field displaced Pedernales in the relative positions of fields. Development in the latter field has been suspended temporarily but production has been holding approximately steady. Twenty wells were added in the shipping fields last month. All new completions produced varying amounts of oil ranging from 500 bbls. per day downward with one exception which was a gasser. The wells were divided by fields as follows: Lagunillas, 7; Bachaquero, 2; Mene Grande, 1; Tarra, 1; Tia Juana, 2; Cumarebo, 1; Temblador, 3; and Quiriquire, 3. The details of production estimated for February by fields and companies appear in the following table:

VENEZUELA OIL PRODUCTION

	February 1939	February 1938	Dly. aver. February 1939
By fields—			
Lagunillas	*7,611,308	5,697,263	271,832
Tia Juana	1,977,637	1,679,310	70,630
Quiriquire	1,964,217	1,917,773	70,150
La Rosa	818,032	1,013,687	29,215
Mene Grande	818,032	1,013,687	29,215
Tarra	392,178	361,209	14,006
Bachaquero	345,270	.....	12,331
Cumarebo	200,807	197,353	7,172
Temblador	158,205	.....	5,650
Pedernales	141,802	139,340	5,065
Concepcion	68,073	74,280	2,430
El Mene	52,220	56,924	1,865
La Paz	44,599	68,323	1,593
Total	14,665,968	13,572,947	523,783
Daily average February 1938	.....	484,747	.....
Daily average January 1939	523,941	.....	.....

*Figure includes all Laga and Creole Lake Maracaibo production.

By companies—			
Venezuela Oil Concessions	4,415,753	3,444,584	157,705
Lago Petroleum Corp.	4,548,533	4,343,971	162,448
Standard of Venezuela	2,597,050	2,563,234	92,752
Mene Grande Oil Co.	1,792,000	1,740,000	64,000
Caribbean Petroleum Co.	818,032	1,013,687	29,215
Colon Development Co.	392,178	361,209	14,006
British Controlled	52,220	56,924	1,865
Northern Venezuela Petroleum Co.	50,202	49,338	1,793
Total	14,665,968	13,572,947	523,783

Colombia Output Increased; Peru Continues Decline

The tempo of crude oil production from Tropical Oil Co. two Colombian fields, Infantas and La Cira, was increased in February to a level not much below that existing at the end of 1938. During the past month, Tropical production averaged 57,469 bbls. per day, an increase of 3,009 bbls. over the daily average rate of output in January. The high for all time was reached last December when daily average yield exceeded 60,000 bbls. for the month. The rate of production last month by Tropical was 9,730 bbls. per day greater than registered in February 1938, when the average was 47,739 bbls. During the first two months of the current year, Tropical produced 3,297,390 bbls. which was 68,914 bbls. more than for the same two months in 1938.

In Peru, International Petroleum Co. production trend is in direct contrast to that of its subsidiary in Colombia. International produced 914,632 bbls. in Peru during February, or at the daily average of 32,665 bbls. For the same month in 1938 the daily average was 36,066 bbls., showing a deficit this year of 3,401 bbls. During the first two months of this year, International produced 1,954,053 bbls. of oil in Peru, a decline of 175,562 bbls., compared with a two-month total of 2,129,615 bbls. registered in 1938.

State Department Urged to Intervene In Bolivian Case

Standard Oil Co. of New Jersey has renewed its request to the Department of State in Washington to intervene formally with the Bolivian Government and demand either a restoration of the oil properties of the company's wholly owned subsidiary in that country or an international arbitration of its claim. This protest followed a decision of the Supreme Court of Bolivia on March 8 dismissing the company's petition for restoration of its properties, which were seized on March 13, 1937.

The company, it is understood, has not put in a claim for money damages on the theory that Bolivia is not able now to pay such a claim if it was allowed. In the event that the issue is arbitrated, the company is of the opinion that a Canadian or European should be the umpire.

Soon after the properties were seized Standard of New Jersey filed a protest with the State Department, asking for arbitration. Officials of the department thought it best, however, that the company exhaust all Bolivian remedies in order to deprive Bolivia of any defense that such remedies should have been sought. With the recent decision of the Supreme Court of Bolivia, the company now is of the opinion that all remedies there have been exhausted.

"Second Baku" Aim of U.S.S.R. Third Five-Year Plan

Creation of a "second Baku" between the Volga River and the Ural Mountains is one of the objectives in the U.S.S.R. third five-year plan, a rough outline of which was presented in Moscow recently. In general the plan calls for an increase in annual production as a whole of 38 per cent by the end of 1942 over the production of 1937. While reference to the establishment of a "second Baku" is only one phase of the general five-year plan, other objectives indicate the reliance placed on petroleum as a medium of accomplishing the goals set up. In the new plan, as in previous ones, the greatest effort will be put into expanding the country's industrial establishment, with goods for popular consumption still taking second place. The country will continue to pour its resources into machine-building, chemicals, armaments, and power plants.

The groundwork for an inland oil center for U.S.S.R. has been prepared with a refinery at Ufa and extensive exploration which has met with favorable results, according to meager reports. The Russians are anxious to develop a petroleum center well removed from the seacoast because of the greater safety factor in the event of attack.

Petroleum exports from the U.S.S.R. through Russian Black Sea ports fell to the lowest level in years during 1938. Petroleum exports from Russia passing Istanbul in 1938, practically the only outlet for Soviet shipments, totaled 930,541 tons compared to 1,552,726 tons in 1937 and with 4,129,007 tons as recently as 1934. The decline since 1934 has been uninterrupted with petroleum shipments dropping to 3,294,943 tons in 1935, and to 2,516,850 tons in 1936.

Compared with 1937, last year's exports of lubricating oils, heavy fuel oils, kerosene, and gasoline declined approximately 45 per cent, 45 per eent, 61 per cent, and 22 per cent, respectively.

Exports during the past five years were (figures in tons):

Products—	1934	1935	1936	1937	1938
Lube oils	254,812	345,488	327,024	212,998	117,412
Fuel oils	1,893,492	1,617,407	1,254,730	741,554	410,001
Kerosene	436,896	400,902	297,388	163,887	64,662
Gasoline	1,331,010	895,425	630,524	434,287	336,643
Asphalt	193,949	33,571	6,376	.....	1,823
Paraffin	8,848	1,150	808	.....	.....
Total	4,119,007	3,293,943	2,516,850	1,552,726	930,541

By Gentry Kidd
Stanolind Oil & Gas Co.

South Texas Developments in 1938 AND 1939

Following the precedent set by the previous annual reports to this convention covering activities in South Texas, this report covers the 12 months' period ending March 1, 1939.

For convenience in this discussion the producing zones will be grouped into six generalized stratigraphic divisions, in sequence from oldest to youngest. Likewise, some of the prospective zones that are often the objectives in wildcat drilling will be included in this sequence. These subdivisions are: (1) the Ordovician and Pennsylvanian of the Edwards Plateau; (2) the Cretaceous in the fault line; (3) the Wilcox, Carrizo, Queen City and Sparta in the lower Eocene trend; (4) the Yegua and Jackson of the upper Eocene; (5) the Frio-Vicksburg beds of basal Oligocene age; and (6) the upper Oligocene and lower Miocene of the coastal area, including the Marginulina-Frio, Catahoula and Oakville.

In a wide belt along the northwest side of the coastal province is found a series of sands, probably both Frio and Vicksburg in age, that has not been satisfactorily subdivided. This series seems to be sufficiently different from the dip Frio to merit a subdivision, and the name Frio-Vicksburg has come into fairly common use as a means of designating it. For the most part, the Frio-Vicksburg appears to be lower stratigraphically than the Frio.

Objectives

The younger formations, successively, are the objectives, from the Edwards Plateau southeastward to the coast. The various Cretaceous and Tertiary producing zones extend across South Texas in trends or belts, roughly parallel to the coast line. Beds of Cretaceous age are on the surface at San Antonio and the surface exposures of all the younger beds are between San Antonio and the coast, a distance of only 140 miles. Of course, most of the formations thin toward the outcrop and many individual zones present in the subsurface do not reach the surface due to lensing or overlap.

During the past year 40 fields were discovered in South Texas. The geographic positions of these are shown on map. In addition, 58 new sands were proved for production in older fields, which number include sands, other than the discovery sand, in the new multiple-sand fields. This record is exceeded only by the year 1937-38, and is above the records of prior years both in the number of discoveries and in probable additions to reserves.

One of the new fields was in the Edwards Plateau, 6 were in the fault line, 16 in the Jackson-Yegua trend, 8 in the Frio-Vicksburg trend, and 9 in the coastal area. Further subdivided, two of the six discovery wells in the fault line were completed in the Austin chalk, two in serpentine, and one each in the Edwards and Taylor. Of the 16 discovery wells in the Jackson-Yegua trend, 12 were completed in Jackson sands and 4 in the Cockfield or Pettus sand zone. The wells in the eight new pools in the lower Frio-Vicksburg are all considered as being from the same general zone. Of the nine fields opened in the coastal area, five produce from sands in the Frio, three from sands in the Marginulina zone and one from a sand in the basal portion of the Oakville.

A geologic subdivision of the 58 new sands in older fields places 1 in the Yegua, 6 in the Jackson, 29 in the Frio-Vicksburg, 19 in the Frio, 1 in the Marginulina zone and 2 in the Catahoula. As these figures correctly suggest, most of the multiple sand pools in South Texas are producing from sands in the Frio, the Frio-Vicksburg and the Jackson.

A.A.P.G.—Presented before annual meeting at Oklahoma City, March 23, 1939.

A comparison of these discoveries with those of prior years shows that the outstanding feature has been the development of important production from the Frio-Vicksburg. This sand group has furnished some production in the past but discoveries during the last 12 months place it among the major oil producing zones in this district. The deep coastal area has duplicated its favorable records by again furnishing substantial additions to reserves, with the Marginulina-Frio zone holding its leading position as probably the greatest source of oil in South Texas. The Jackson-Yegua trend continued to lead in the number of new fields but most of them may prove to be relatively small and the total of their ultimate recoveries will probably be far less than the total recoveries from the smaller number of coastal fields. Likewise, the six Cretaceous fields opened in the fault line may have small recoveries.

Nearly all of the discoveries in the coastal area and in the Frio-Vicksburg trend must be credited to geophysical exploration. In most instances, reflection-seismograph work is to be given the direct credit in the selection of the locations of the discovery wells. Torsion balance, gravity meter, or magnetometer, were used in some cases in preliminary exploration.

On the contrary, very few of the discoveries in the Jackson-Yegua trend or in the fault line may be credited to geophysical exploration. Most of these discovery locations are attributed to subsurface geology and trend drilling. It is generally conceded that seismograph work has not proved very satisfactory in many portions of the Jackson-Yegua trend and the fault line, partly because of the difficulties presented by the surface formations and partially because of the low structural relief, and the small size and the faulted conditions of many of the structures. Also the stratigraphic traps in many of the Jackson fields seem to present an insurmountable problem to the ordinary geophysical methods.

Edwards Plateau

As usual, there was very little drilling activity in the Edwards Plateau during the year. Plateau Oil Co. opened the Junction field in Kimble County with two wells producing small quantities of oil and gas, one from the Pennsylvanian at 1,400 feet and the other from the Ellenburger at 1,800 feet. Nothing more than minor production from a few wells has ever been developed in that portion of the Edwards Plateau included within South Texas.

Fault Line

Most of the discoveries made in the Cretaceous during 1937 have thus far proved to be very small and approximately one-half of them are still one-well pools with one of more offset failures. The same is true of the 1938 discoveries, none of which have yet been developed into a pool of appreciable size.

The amount of drilling activity in the fault line has decreased materially from that of the past several years. The reasons for this decrease are probably the disappointing results in the new producing areas and the approach of the desired density of drilling in the older fields.

New Cretaceous pools are Chriesman in Burleson County, producing from the Edwards; Schattel in Frio County and Spiller in Guadalupe County from Austin chalk; Walnut Creek in Caldwell County and Dunlay in Medina County from serpentine; and Riddle in Bastrop County from the "Dale lime," which is a local formation probably basal Taylor in age.

The discovery and only producing well in Schattel proved to be very small and it was plugged and abandoned after several dry holes were drilled in the locality. With one exception, none of the other discoveries seem to merit further discussion, because they are more or less typical of the smaller types of fault line field.

Chriesman.—The mapping of a fault-structure on the surface led to drilling in the Chriesman area. The first two tests were failures and the third test, drilled by Red Bank Oil Co., was completed with an initial production of 180 bbls. daily of 40° gravity oil, pumping from Edwards limestone at 6,167-6,173 feet. No additional wells have been drilled. This discovery is of particular sig-

nificance because it may revive interest in a wide belt, downdip from the usual producing trend. Heretofore, commercial production from the Edwards has been limited to a maximum depth of approximately 2,700 feet.

Lower Eocene

Only minor production has ever been found in South Texas in the lower Eocene group. Nearly all of this has been from the Queen City in the Lopena field, Zapata County, which yielded gas. Comparatively few wells have penetrated these formations and little subsurface information is available. However, recent discoveries in the Wilcox and Sparta in Louisiana and eastern Texas have placed these zones in the spotlight as objectives in wildcat drilling, so additional development along this trend is to be expected. The year 1938 added no new production from these zones.

Jackson-Yegua Trend

A continuation of the relatively active wildcat drilling campaign along the Jackson-Yegua trend resulted in the discovery of 16 fields. New pools in the Cockfield or Pettus zone are Tulsita in Bee County, Fitzsimmons and Tesoro in Duval County, and Ramirena in Live Oak County. All of the other new fields are producing from sands in the Jackson. They are Casa Blanca, Cedro Hill, Longhorn and Los Picachos in Duval County; Bandera in Jim Wells County; White Creek in Live Oak County; Campana, Munson and San Jose in McMullen County; Charco Blanco and Sacatosa in Starr County; and North Killam in Webb County.

Although the number of Jackson and Cockfield discoveries in 1938 is nearly as large as the number in 1937, the quality of the new fields, as a whole, seems to be inferior. Further development will be unnecessary before many of the new pools may be correctly evaluated; however, present information makes it appear that many of them will be of minor importance and that none of them will compare favorably in size with several of the larger fields in this trend.

Fitzsimmons.—The opening of the prolific North Sweden or Benavides field in eastern Duval County in 1937 resulted in an active play for deeper Jackson and Cockfield production, downdip from the older producing areas. This deeper play led to the discovery of the Fitzsimmons field in northeastern Duval County by Jack Porter and others. The principal producing sand averages 4,300 feet in depth and is the Pettus member of the Cockfield. A shallow Jackson sand at 3,600 feet in the Hockley zone furnishes minor production in one well. Present development totals 50 oil wells on 10-acre spacing and 4 failures. The gravity of the oil is 47° and the initial production of the wells varies from 100 bbls. to over 200 bbls. daily, flowing through one-eighth to one-fourth inch chokes. Accumulation is due to structural closure against a strike fault of around 140 feet displacement, downthrown to the northwest, the field being elongated in a northeasterly direction.

Casa Blanca and Cedro Hill. A limited program of shallow wildcat drilling by Magnolia Petroleum Co. on its extensive leaseholdings in northwestern Duval County resulted in the opening of the Casa Blanca and Cedro Hill fields. Production in both fields is from the Cole sand series near the top of the Jackson.

Casa Blanca now has 36 oil wells, 3 gas wells and 6 dry holes on 10-acre spacing. The producing sand averages 1,200 feet in depth and the initial production of the wells ranges from 50 to over 100 bbls. daily, some pumping and others flowing. The oil is the usual Mirando type of crude of 20° gravity. Accumulation is probably due to a combination of low relief structure and stratigraphic trap, similar to most of the Jackson fields.

Magnolia's discovery well in Cedro Hill was completed in November, 1938, at 1,441-51 feet, with an initial production of 30 bbls. per day, pumping. No additional wells have been drilled.

Frio-Vicksburg Trend

Developments in the Frio-Vicksburg trend during the year have elevated this group to a place among the major oil producing zones in South Texas. The new fields are McAllen in Hidalgo County; Kelsey in Jim Hogg County; Alice, East Alice, La Gloria and Blucher in Jim Wells County; and La Reforma and Sun in Starr County.

Alice.—This field, located in central Jim Wells County, was discovered in April, 1938, by H. H. Howell. There are 62 oil wells in the field, of which 6 are twins, 2 gas wells and 10 dry holes. The spacing program is 20 acres. The gravity of the oil varies from 38° to 43° and the several producing zones range from 4,500 to 5,500 feet in depth. Excellent ultimate recoveries are anticipated from these high-pressure sands. The producing sands all lense out to the west, forming a stratigraphic trap that is associated with an undetermined amount of structural folding and possibly faulting.

East Alice.—East Alice appears to be a separate field centering 2 miles northeast of the Alice field. Most of the development has taken place within the last three months and now totals 15 oil wells and 1 gas well. Production is from several sands in the same general zone as the Alice pays.

Blucher and La Gloria.—The opening of the East Premont field in 1937 aroused intense interest in the southern portion of Jim Wells County. Several miles southwest of East Premont, Shell Petroleum Corp. opened the Blucher field with a high-pressure gas and distillate well at 7,555-60 feet. Still farther southwest, Magnolia Petroleum Co. is nearing completion of its discovery well at La Gloria. Drill-stem tests have indicated large gas and distillate production from a number of sands between 5,200 and 6,100 feet. Both Blucher and La Gloria are reflection-seismic prospects.

Kelsey.—In August, 1938, Humble Oil & Refining Co. completed the discovery well in the Kelsey field in Jim Hogg County at 4,740-48 feet with an initial production of 94 bbls. daily, flowing through one-eighth inch choke, gravity 43°. Subsequent development includes six oil wells and three dry holes. Accumulation is probably due to anticlinal structure.

Sun.—Both geophysical exploration and core drilling preceded Sun Oil Co.'s discovery of the Sun field in Starr County. The discovery well was completed at 4,853-56 feet with an initial production of 182 bbls. of 42° gravity oil daily, flowing through a small choke. There are now six oil wells and one gas well in the field, scattered over an area 2 miles long and 1 mile wide. Two outlying dry holes have been drilled. Production is from three or more different zones between 4,600 and 5,100 feet and the pay sands seem to be erratic and lenticular in nature.

Coastal Area

The new Frio fields in the coastal area are Francitas in Jackson County; Riverside in Nueces County; and Bonnieview, La Rosa and Melon Creek in Refugio County. The Marginulina or Greta zone was found productive in the West field in Jackson County, the Bird Island field in Kleberg County and the East Plymouth field in San Patricio County. The other new coastal field is Cordele in Jackson County, which is producing from a sand thought to be basal Oakville in age.

Cordele.—The Cordele field in northern Jackson County was opened by H. J. Porter on completion of a well at 2,652-60 feet with an initial production of 125 bbls. daily, flowing through a small choke. There are now 15 oil wells, 2 gas wells and 2 dry holes in the area. Structural closure against a fault with over 200 feet of throw, downthrown to the northwest, accounts for the accumulation. The Oakville, which produces here, has furnished some gas production in South Texas, but there has been very little oil produced from it.

West.—Magnolia Petroleum Co. completed the discovery well in this field at 5,080-86 feet. The initial production was 132 bbls. per day of 25° gravity oil through 9/64-inch choke, from the upper portion of the Marginulina or Greta sand zone. There are now six oil wells on this seismic prospect. The accumulation appears to be near the top of a large anticlinal fold.

Bird Island.—The Bird Island field is located in Laguna Madre, 1½ miles from the mainland. Pure Oil Co. worked this submerged area with seismograph and later drilled and completed a large gas well spraying some distillate. The production is from the Marginulina zone at 7,210-78 feet. The field is farther downdip than any other producing area in South Texas.

La Rosa.—For a number of years it has been generally known that the La Rosa area was structurally high and several tests had been drilled in the general area. Coronado Exploration Co. selected the discovery location as a result of seismic work. The field now has 22 oil wells on 20-acre spacing and the producing area is not yet defined. Oil production is from three zones in the Frio at 5,900, 6,100 and 6,300 feet. The oil is 40° gravity and the initial production of the wells is over 100 bbls. daily on small choke.

Melon Creek.—Copano Oil Co. opened the Melon Creek field in Refugio County in February, 1939. The discovery well was completed in Frio sand at 5,855-75 feet with an initial production of 240 bbls. daily through 5/32-inch choke, gravity 38°. This new field is a short distance southwest of and along strike with the Tomoconnor field, which is considered the greatest oil reserve and most prolific field in South Texas. The pay sand in Melon Creek appears to correlate with the thickest pay zone in Tomoconnor.

Older Fields

The outstanding new sands and extensions in older fields were at McCampbell in Aransas County; Samfordyce in Hidalgo County; Clara Driscoll and West Saxet in Nueces County; and East White Point in San Patricio County. A recent 1-mile south extension to McCampbell resulted in an active drilling campaign. West Saxet and East White Point, discovered late in 1937, have developed into excellent Frio sand pools of small size.

Deeper Drilling

In the Agua Dulce field, Nueces County, Union Producing Co. drilled its Minnie Brown No. 1 to a total depth of 13,728 feet, setting a new depth record for the Mid-Continent area. This well is the third deepest test in the world and the deepest outside of California. It did not find any additional pay zones and has been plugged back and completed in one of the shallower sands.

The trend continues to be toward deeper drilling. It has been an important factor in the discovery of many of these new fields and new sands. On the other hand, it has furnished some disappointing information by showing that some of the productive sand zones grade downdip into much thicker shale zones that are devoid of sand.

(Continued on Page 79)

LINCOLN "SHIELD-ARC" WELDING
used almost 100% for the New RICHFIELD REFINERY

Photo courtesy of C. F. Braun & Co., Alhambra, Calif.

Low-cost construction and low-cost refining have been assured the new $5,000,000 plant of the Richfield Oil Corporation at Watson, California, by the extensive use of welding. Almost 100% of this welding was done with Lincoln Equipment.

In the fabrication and erection of fractionating equipment and piping, the General Contractors, C. F. Braun & Co., used about 50 *"Shield-Arc"* Welders and five carloads of "Fleetweld" Electrodes. This work includes about 30 miles of welded joints.

For details concerning the use of *"Shield-Arc"* welding in the construction and maintenance of refineries, consult the nearest Lincoln office.

•

NEW! *"Shield-Arc"* Welder with Self-Indicating "Job Selector" and Self-Indicating Current Control assures maximum speed and quality for every welding job. Mail the coupon.

THE LINCOLN ELECTRIC CO.
Dept. N-581, Cleveland, Ohio

Send free copy of "The New Lincoln *'Shield-Arc'*," Bulletin 412-A.

Name _____

Position _____

Company _____

Address _____

City _____ State _____

LINCOLN SHIELD-ARC WELDING

PRODUCES A STRONGER, MORE LASTING CONSTRUCTION FASTER, AT LESS COST

Programs and Meetings

Preliminary Program A.P.I. Eastern District Meeting

The preliminary program for the spring meeting of the Eastern district, Division of Production, American Petroleum Institute, at the William Penn Hotel, Pittsburgh, Pa., April 4-5, 1939, follows:

Tuesday, April 4

8:30 a.m. Registration.

10 a.m. Morning session.

"Oriskany Sand Development in West Virginia and Oil and Gas Possibilities in It and Deeper Horizons," Paul H. Price, West Virginia state geologist.

Discussion by J. E. Billingsley, geologist, West Virginia Gas Corp., Charleston, W. Va.

"Recent Developments in the Oil and Gas Industry in Michigan," Harold McClure, president, Michigan Oil and Gas Association, Alma, Mich.

Discussion by Dr. Virgil R. Kirkham, Saginaw, Mich.

1:30 p.m. "Progress Report on Developments in Southern Illinois and Adjacent Territory in Western Kentucky and Indiana," Theron Wasson, chief geologist, Pure Oil Co., Chicago. Discussion.

"Dehydration of Natural Gas," H. M. Baker, superintendent, compressor division, United Fuel Co., Charleston, W. Va. Discussion.

"High Pressure Gas Transmission," John Clarke, engineer, Hope Natural Gas Co., Clarksburg, W. Va. Discussion.

7 p.m. Annual dinner and entertainment.

Fred A. Benkert, Peoples Natural Gas Co., has been appointed chairman of the entertainment committee.

Wednesday, April 5

9:30 a.m. "Improvements to Chemical Treatments of Oil and Gas Wells," P. E. Fitzgerald, geologist, Dowell, Inc., Tulsa.

Discussion by B. B. Wescott, Gulf Research & Development Co., Pittsburgh, Pa.

"A Review of Illinois Basin Operating Problems," Ralph E. Damp, production superintendent, Carter Oil Co., Mattoon, Ill.

Discussion by R. W. McIlvain, Jr., division manager, Pure Oil Co., Olney, Ill.

"Modern Methods Applied to Cleaning Out and Drilling Deeper," John A. Thompson, chief engineer, Belmont Quadrangle Drilling Corp., Bradford, Pa. Discussion.

1:30 p.m. "Oil and Bearings," R. J. S. Pigott, staff engineer, and P. G. Exline, lubrication engineer, Gulf Research & Development Co., Pittsburgh, Pa. Discussion.

"Production Flooding Efficiency," Harry M. Ryder, Ryder-Scott Oil Producers, Bradford, Pa. Discussion.

"A Critical Survey of the Geochemical Methods of Prospecting for Oil and Gas," Sylvain Pirson, head, department petroleum and natural gas engineering, Pennsylvania State College.

Discussion by A. J. Teplitz, Gulf Research & Development Co., Pittsburgh, Pa.

Report of nominating committee and annual election of officers.

Christy Payne, Jr., is general chairman. The program committee is composed of D. T. Ring, chairman, Preston Oil Co., Columbus, Ohio; O. W. Van Petten, Columbian Carbon Co., Charleston, W. Va.; J. J. Schmidt, East Ohio Gas Co., Cleveland, Ohio. Registration—John A. Thompson, Belmont Quadrangle Drilling Corp., Bradford, Pa. Arrangements—T. H. Myers, Carnegie Natural Gas Co., Pittsburgh, Pa. Entertainment—F. A. Benkert, Peoples Natural Gas Co., Pittsburgh, Pa.

Eastern district officers for year 1938-39: Christy Payne, Jr., chairman, Peoples Natural Gas Co., Pittsburgh, Pa.; F. A. Benkert, vice chairman, Peoples Natural Gas Co., Pittsburgh, Pa.; T. H. Myers, vice chairman, Carnegie Natural Gas Co., Pittsburgh, Pa.; D. T. Ring, vice chairman, Preston Oil Co., Columbus, Ohio; J. J. Schmidt, vice chairman, East Ohio Gas Co., Cleveland, Ohio; O. W. Van Petten, vice chairman, Columbian Carbon Co., Charleston, W. Va.; J. A. Thompson, secretary-treasurer, Belmont Quadrangle Drilling Corp., Bradford, Pa.

Advisory committee: F. E. Eckert, chairman, Hanley & Bird, Bradford, Pa.; J. C. Askam, Ohio Oil Co., Findlay, Ohio; H. D. Atha, Gordon Oil Co., Mount Pleasant, Mich.; William Bell, Bell Brothers, Robinson, Ill.; S. J. Brendel, S. J. Brendel Oil & Gas, Inc., Pittsburgh, Pa.; F. M. Brewster, Belmont Quadrangle Drilling Corp., Bradford, Pa.; E. F. Clagett, Pure Oil Co., Saginaw, Mich.; P. H. Curry, South Penn Oil Co., Pittsburgh, Pa.; Forest D. Dorn, Forest Oil Corp., Bradford, Pa.; K. C. Heald, Gulf Oil Corp., Pittsburgh, Pa.; D. S. Keenan, United Carbon Co., Charleston, W. Va.; J. C. Montgomery, Jr., United Natural Gas Co., Oil City, Pa.; J. H. Newlon, Equitable Gas Co., Pittsburgh, Pa.; Christy Payne, Jr., Peoples Natural Gas Co., Pittsburgh, Pa.; S. J. Pirson, Pennsylvania State College, State College, Pa.; John Post, Oil Well Supply Co., Oil City, Pa.; Paul H. Price, state geologist, Morgantown, W. Va.; C. C. Reed, Hope Natural Gas Co., Clarksburg, W. Va.; J. R. Reeves, Cities Service Co., Elmira, N. Y.; J. French Robinson, Peoples Natural Gas Co., Pittsburgh, Pa.; Frank Schauer, Equitable Gas Co., Pittsburgh, Pa.; E. N. Smith, National Supply Co., Pittsburgh, Pa.; F. N. Speller, National Tube Co., Pittsburgh, Pa.; Don Wilson, Columbia Oil & Gasoline Corp., New York; R. T. Zook, Sloan & Zook Co., Bradford, Pa.

Gas Measurement Course Program at Norman

The Southwestern Gas Measurement Short Course wil be held at Norman, Okla., April 18, 19, 20. The general assembly will be opened at 9:30 a.m. Tuesday, April 18, with L. G. Rheinberger, Sinclair Prairie Oil Co., chairman, general committee, presiding. Following an introduction by Glenn C. Kiley, president, Oklahoma Utilities Association, Dr. William Bennett Bizzell, president, University of Oklahoma, will deliver the address of welcome.

An address on the Natural Gas Association of America and the Gas Measurement Short Course will be delivered by William F. Lowe, secretary, Natural Gasoline Association of America.

E. H. Poe, secretary, natural gas section, American Gas Association, will speak on "Three Hours a Week," followed by the report of the committee for study of practical methods by Earl Kightlinger, Arkansas Louisiana Gas Co.

This will be the fifteenth annual Gas Measurement Short Course sponsored by College of Engineering, University of Oklahoma, assisted by Corporation Commission of Oklahoma, Railroad Commission of Texas, Kansas Corporation Commission, Oklahoma Utilities Association, Natural Gas Section, American Gas Association, Natural Gasoline Association of America.

The executive committee consists of Dean W. H. Carson, chairman; Gilbert Estill, L. G. Rheinberger, C. B. Day, E. E. Stovall, R. D. Turner, George P. Bunn, F. D. Franks and D. A. Sillers.

CALENDAR

April

AMERICAN CHEMICAL SOCIETY, Baltimore, Md., April 3-7.

AMERICAN PETROLEUM INSTITUTE, spring meeting of eastern district, Division of Production, William Penn Hotel, Pittsburgh, Pa., April 4-5.

AMERICAN PETROLEUM INSTITUTE, spring meeting of Pacific Coast district, Division of Production, Biltmore Hotel, Los Angeles, Calif., April 11.

NATIONAL PETROLEUM ASSOCIATION, semi-annual meeting, Hotel Cleveland, Cleveland, Ohio, April 13-14.

OIL BURNER INSTITUTE, fifteenth annual meeting, New York, April 18.

AMERICAN PETROLEUM INSTITUTE, Division of Production, Mid-Continent district, Skirvin Hotel, Oklahoma City, Okla., April 18-19.

OIL-WORLD EXPOSITION, Houston, Tex., April 24-29.

May

PETROLEUM ELECTRICAL SUPPLY ASSOCIATION AND PETROLEUM INDUSTRY ELECTRICAL ASSOCIATION, Rice Hotel, Houston, Tex., May 2-4.

NATURAL GASOLINE ASSOCIATION OF AMERICA, Hotel Tulsa, Tulsa, Okla., May 3-4-5.

AMERICAN PETROLEUM INSTITUTE, ninth midyear meeting, Roosevelt Hotel, New Orleans, La., May 15-18.

NATURAL GAS SECTION, A.G.A., annual meeting, Tulsa, May 8-11.

WORLD AUTOMOTIVE ENGINEERING CONGRESS, sponsored by S.A.E. for New York (May 22-26), Indianapolis (May 20), Detroit (May 31-June 2), San Francisco (June 6-8), May 22-June 8.

NATIONAL ASSOCIATION OF PURCHASING AGENTS, annual convention (Oil Company Buyers' Group), Fairmont Hotel, San Francisco, Calif., May 21-25.

June

ILLINOIS-INDIANA PETROLEUM ASSOCIATION, seventh annual conference, Robinson, Ill., June 3.

PENNSYLVANIA GRADE CRUDE OIL ASSOCIATION, Hotel Hershey, Hershey, Pa., June 15-16.

THIRTEENTH INTERNATIONAL CONGRESS OF CARBIDE, ACETYLENE, OXYACETYLENE WELDING AND ALLIED INDUSTRIES, Munich, Germany, June 25-July 1.

August

MICHIGAN OIL AND GAS EXPOSITION, Mount Pleasant, Mich., Aug. 1-6.

Modernization of Steam and Electrical Facilities

By HENRY FLYNN
Power Engineer, Texas Co.

Expansion of refining equipment to meet the ever increasing demands of the Port Arthur refinery of the Texas Co. has resulted in steam and power requirements justifying additional utility facilities. Following its policy of maintaining an outstanding position as refiners, the company over the past two years has added to its solvent refining and solvent dewaxing plants using its own patented processes, and has also added to its deasphalting, cracking, polymerization, stabilization, and butane treating plants. These additions, and changes in operating procedure on other processes have altered the plant steam and electrical power balance. The resulting utility requirements could not be economically supplied with existing steam and electric power generating equipment. In order to provide utility requirements for minimum operating costs, the company decided to install the most modern and efficient type of utility facilities to meet requirements of its particular steam and electric power balance. The services of Jackson & Moreland, consulting engineers of Boston, Mass., were obtained to work with company engineers in developing the type and design of the additional utilities.

The present steam generating facilities consist of four boiler houses operating at 150 pounds saturated steam pressure, with a total of 36 boilers aggregating 16,076 rated boiler horsepower. The existing power station has 7,440 rated boiler horsepower installed in 10 units operating at 215 pounds per square inch and 200° F. superheat, and three 3,000 kw., 80 per cent power factor, 2,400 volt, 3 phase, 60 cycle, 3,600 r.p.m. turbo-generators. Two of these turbo-generators operate condensing, and the third unit operates against 15 pounds per square inch back pressure. This station was put in operation in 1923 and has had some changes and additions since that date.

The existing steam generating plants are taxed to capacity, with total steam requirements averaging between 1,100,000 and 1,200,000 pounds per hour, and peak demands in excess of these figures. Electric power loads are reaching peaks of 18,000 kw. at present, with average loads between 14,000 and 15,000 kw., and predicted loads in the near future of 19,000 kw. Under present conditions, a large portion of the electrical power is purchased from a local public utility company.

Due to increased steam loads, the company was faced with the problem of adding to its present steam generating capacity, and in addition some of its existing boiler capacity was reaching a stage requiring replacement. The time was opportune for the installation of high-pressure boilers and generators operating against back pressures to meet refinery steam pressure demands.

Type of Plant and Construction

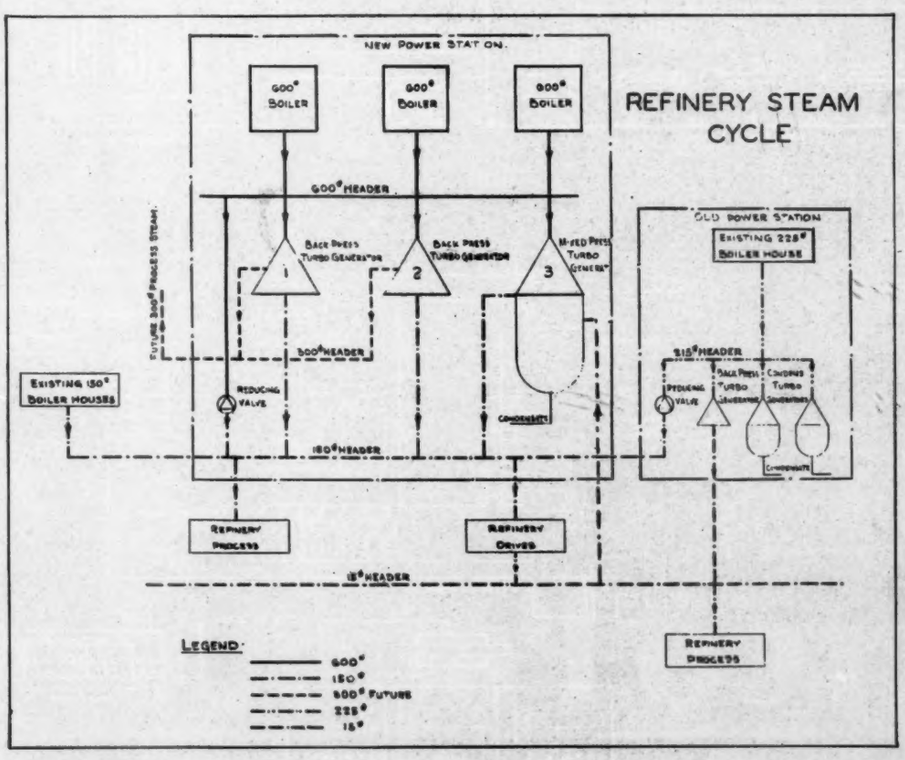
A study of the heat balance with steam and electric power balance for the entire refinery definitely indicated that a back pressure plant with initial pressure at 600 pounds per square inch and exhausting against 150 pounds per square inch pressure offered the greatest economy and best fitted into the ultimate picture.

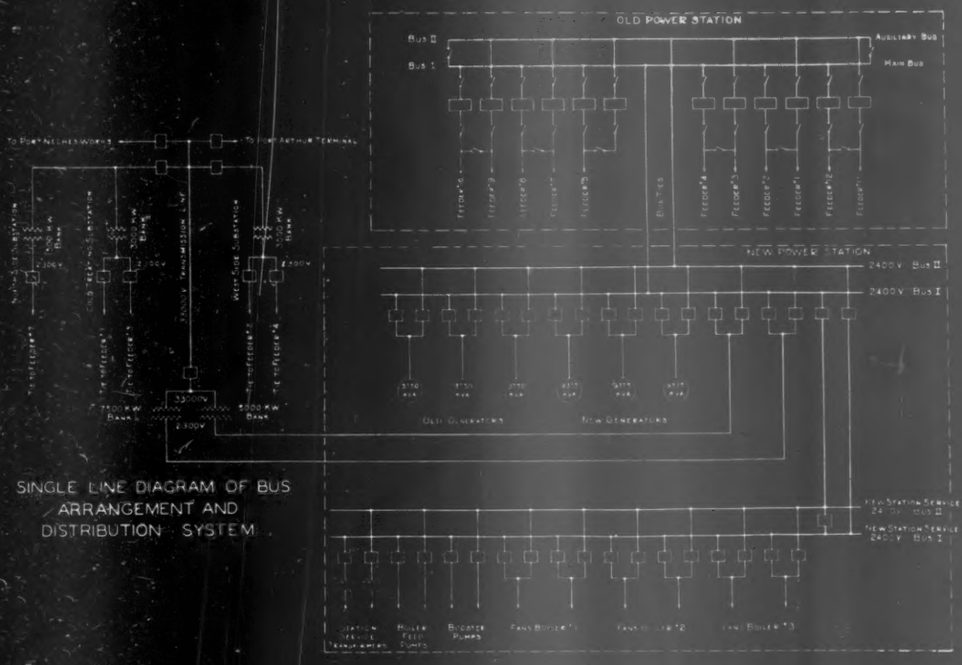
Due to the moderate temperatures encountered in the Gulf Coast region where the plant is to be located, coupled with the fact that, generally, refinery equipment is constructed with very little housing over same, it was decided to construct the boiler portion of this plant for outdoor operation, in so far as possible. Consequently, boilers were designed with steel weatherproof casings; forced and induced draft fans and their drives, as well as the air heater were also designed for outside operation with no housing. Only the firing aisle which includes space for boiler feed water pumps and fuel oil pumps will be housed, the remainder of the equipment being constructed in the open.

The boiler plant consists of three steam generators designed for 675 pounds per square inch when operating at 615 pounds gauge pressure, with capacity of 300,000 pounds per hour, with 340° F. inlet feed water and 715° F. steam temperature. These boilers are of the three-drum type, with steam washers and having furnace entirely enclosed in water walls.

The main fuel will be refinery gas with a 1,600 B.t.u. per cubic foot heating value. However, burners and lines are provided to obtain maximum output with natural gas with 1,000 B.t.u. heating value, or with any mixture of the two gases. Liquid fuel oil will be used as an emergency fuel, and full equipment to handle this fuel will be provided. Burners can use any of the above three fuels without any change. In addition, full provision will be made in burner, furnace, and general plant design for future conversion to pulverized coke burning.

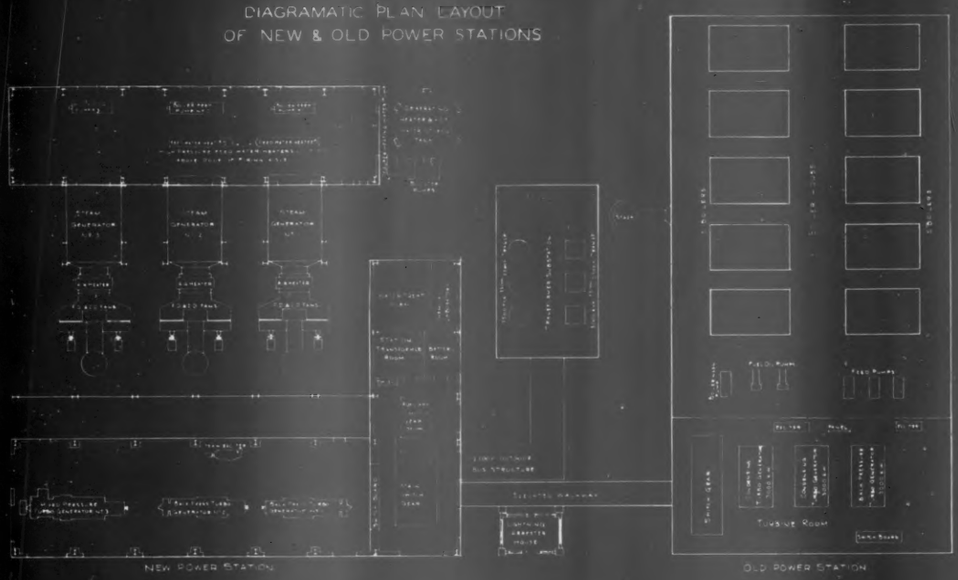
Due to the possibility of utilizing four fuels in the ultimate picture, provision will be made for controlling the superheat by means of a superheater by-pass damper. Air heaters were selected rather than economizers due to low maintenance cost, and the fact that there is considerable low range heat available for heating feed water from other sources. Two sets of forced and induced draft fans are provided for each boiler. Each set of fans consists of one forced draft fan with a capacity of 187,500 cu. ft. per minute at 14.8 inches of water and 80° F., and one induced draft fan with a capacity of 205,000 cu. ft. per minute at 14.8 inches of water and 400° F., mounted on a single shaft and driven by a 400-hp. motor. A single set of fans is capable of carrying the boiler at 70 per cent

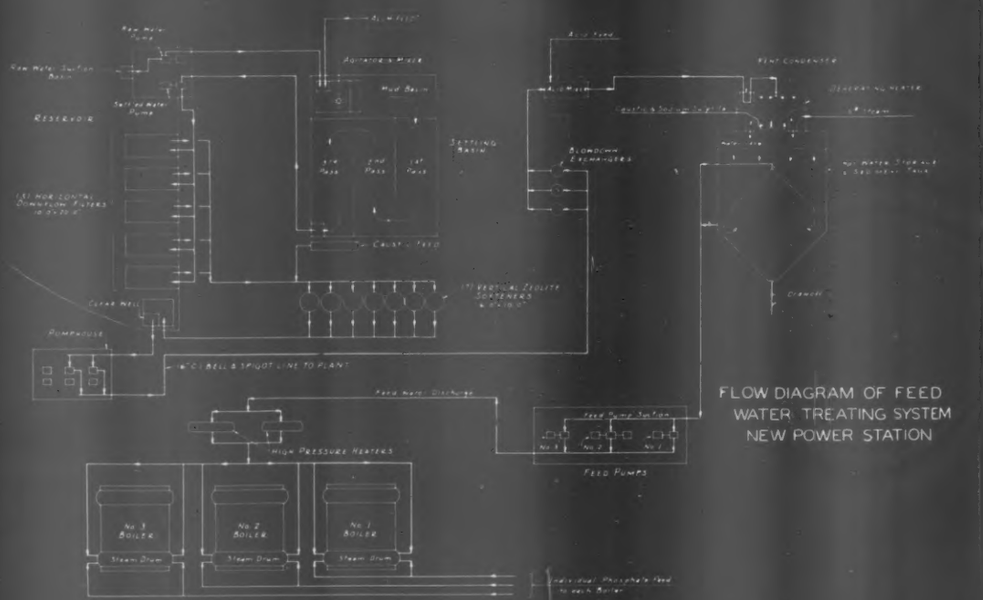




SINGLE LINE DIAGRAM OF BUS ARRANGEMENT AND DISTRIBUTION SYSTEM

DIAGRAMATIC PLAN LAYOUT OF NEW & OLD POWER STATIONS





FLOW DIAGRAM OF FEED WATER TREATING SYSTEM NEW POWER STATION

maximum rating. Constant speed motors with vane control on the inlets of the fans were selected due to the economy of first cost and base load nature of refinery steam load. Motors will be connected to each of duplicate auxiliary busses.

Three five-stage boiler feed water pumps, one of which is a spare, each with a capacity of 525,000 pounds per hour or 1,130 g.p.m., will supply feed water to two high-pressure heaters where it will be heated to 340° F. before entering the boilers. One pump will be driven by a 700-hp. motor; one by a 700-hp. turbine, and the third will be dual driven. Motor drive will be the normal operation, with steam turbines automatically picking up the load in the event of motor failure or curtailment of electric power. Turbines will operate between 150 pounds per square inch steam throttle and 15 pounds back pressure.

To provide for use of steam generating capacity of the three boilers in excess of the turbo-generator requirements, a reducing valve and desuperheating station with a capacity of 350,000 pounds per hour will be installed. This station actually will operate as a spill-over station controlling the pressure in the 600-pound main, and will only relieve that steam not required by the turbo-generators, holding the pressure on the 600-pound header constant. This type of control simplifies the question of combustion control, as the purpose of the latter is to maintain a uniform steam pressure in the main steam header. Consequently, a semiautomatic combustion control will be installed whereby the fuel will be regulated by hand, but any variation in the fuel flow to the boiler will automatically maintain combustion conditions at a predetermined point by adjusting the forced and induced draft fan controls and dampers to insure a constant fuel-air ratio. This type of control adapts itself very nicely to general plant conditions as these new boilers will operate through the turbines and reducing valve, in parallel with existing low-pressure boiler houses. By operating the new boilers at a maximum base load, the best general plant efficiency can be obtained, because with variations in refinery demand for 150-pound steam, the present boiler houses will be forced to drop and pick up load with refinery swings, while the new station will operate at maximum base load and efficiency.

Water Treating Plant

The present water treating facilities now in use for present boiler plants, other than the existing power station, consist of a cold water treating plant where Neches River water is treated with alum, coagulated and settled, sand filtered and zeolite treated. The effluent from this plant has practically zero hardness and a sulfate-carbonate ratio of approximately 1:1. With the 615 pounds per square inch pressure contemplated, a 3:1 sulfate-carbonate ratio is required. In order to use the present plant without change, the effluent from the existing plant will be treated with sulfuric acid at the inlet of a new deaerating type heater operating at 15 pounds per square inch steam pressure and the CO_2 driven off, with consequent reduction of alkalinity and the desired sulfate-carbonate ratio obtained without materially changing the total solid content of the water. To eliminate the danger of corrosion, the acid mixer and inlet line to the deaerator are rubber lined, and the upper portion of the deaerator itself is constructed with a layer of 18-8 stainless steel integrally fused with the carbon steel parent metal If required, caustic soda and sodium sulfite will be introduced at the outlet of the deaerator to control the alkalinity and to eliminate all hazards of oxygen corrosion. Phosphate will be added in the steam drum of each individual boiler below the steam washer. A 700,000-pound cone-bottom tank for hot water storage will be installed immediately below the deaerator, with full provision for use as a hot treatment sedimentation tank if later required.

A flow diagram of the entire water treating system is shown on Page 74.

Three 7,500 kw., 80 per cent power factor. 2,400 volt, 60 cycle, three phase, 3,600 r.p.m. generators with direct connected exciters were selected. Two of these units are driven by back pressure turbines operating between 585 pounds per square inch, 700° F. throttle steam, and 150 pounds per square inch back pressure with provision for future extraction at the 300 pounds per square inch stage. The third unit is driven by a mixed pressure turbine at 585 pounds per square inch, 700° F., extraction at 150 pounds per square inch induction at 15 pounds per square inch saturated and condensing at 27 inches of mercury vacuum. This latter unit provides for induction of 125,000 pounds per hour of low-pressure steam which may be available. The problem of steam and power balance indicated a surplus of low-pressure 15-pound steam. The elimination of this surplus would require an extensive motorization plan at a very large investment. The selection of the third turbine of the mixed-pressure design permitted the utilization of this surplus low-pressure steam, and eliminated the necessity of converting the prime movers to motor drive at this time. This type of unit will fit into any comprehensive program of motorization in the future without sacrificing efficiency or availability of installed capacity.

A steam-driven exciter will provide excitation through an excitation bus for either of the three generators in the event of loss of a direct connected exciter.

The generators will be connected to each of parallel busses through duplicate 3,000-ampere metal-clad oil circuit breakers controlled from a duplex switchboard.

For station service, a 1,200-ampere oil circuit breaker will connect each of the parallel main busses with two parallel auxiliary busses and all auxiliary electrical equipment can be operated from either of the two auxiliary busses. In addition to bus tie breaker will be installed between the two auxiliary busses so that both auxiliary busses may be connected to either or both of the main busses.

Changes to Old Station and Distribution System

The oil circuit breakers controlling the three 3,000 kw. 80 per cent power factor generators in the old power station which is approximately 100 feet distant from the new station, had insufficient interrupting capacity, and will be replaced by new metal-clad oil circuit breakers in the new station. New generator leads from the generators in the old station to new breakers in the new station are to be installed under a completely housed elevated walkway between the two stations.

Two 3,000-ampere bus ties will be installed overhead in the walkway, tying the parallel new busses with the old bus in the old station. The old bus is a ring type and will be strengthened and revamped into parallel busses.

There are to be only two distribution feeders from the new station, one feeding an old 5,000 kw. transformer bank, and the other feeding a new 7,500 kw. transformer bank, which step up the voltage to 33,000 volts for transmission to outlying plants and substations. The revamped bus in the old station will become entirely a feeder bus. By utilizing the old generator breakers removed from service, and rearranging other breakers, it will be possible to provide all feeders emanating from this bus with duplicate breakers or two sources of feed, or the equivalent.

In that all generating capacity in both stations will be controlled from the new station switchboard, a new miniature panel board will be installed as part of the new duplex control board in the new station, and complete control of all feeders in the old station will be brought over to the new station switchboard. Control of 33,000-volt breakers which is in the old station will likewise be brought into the new station. With such centralized control, the operator in the new station will have complete control of the distribution of all power and of all generating capacity in both stations.

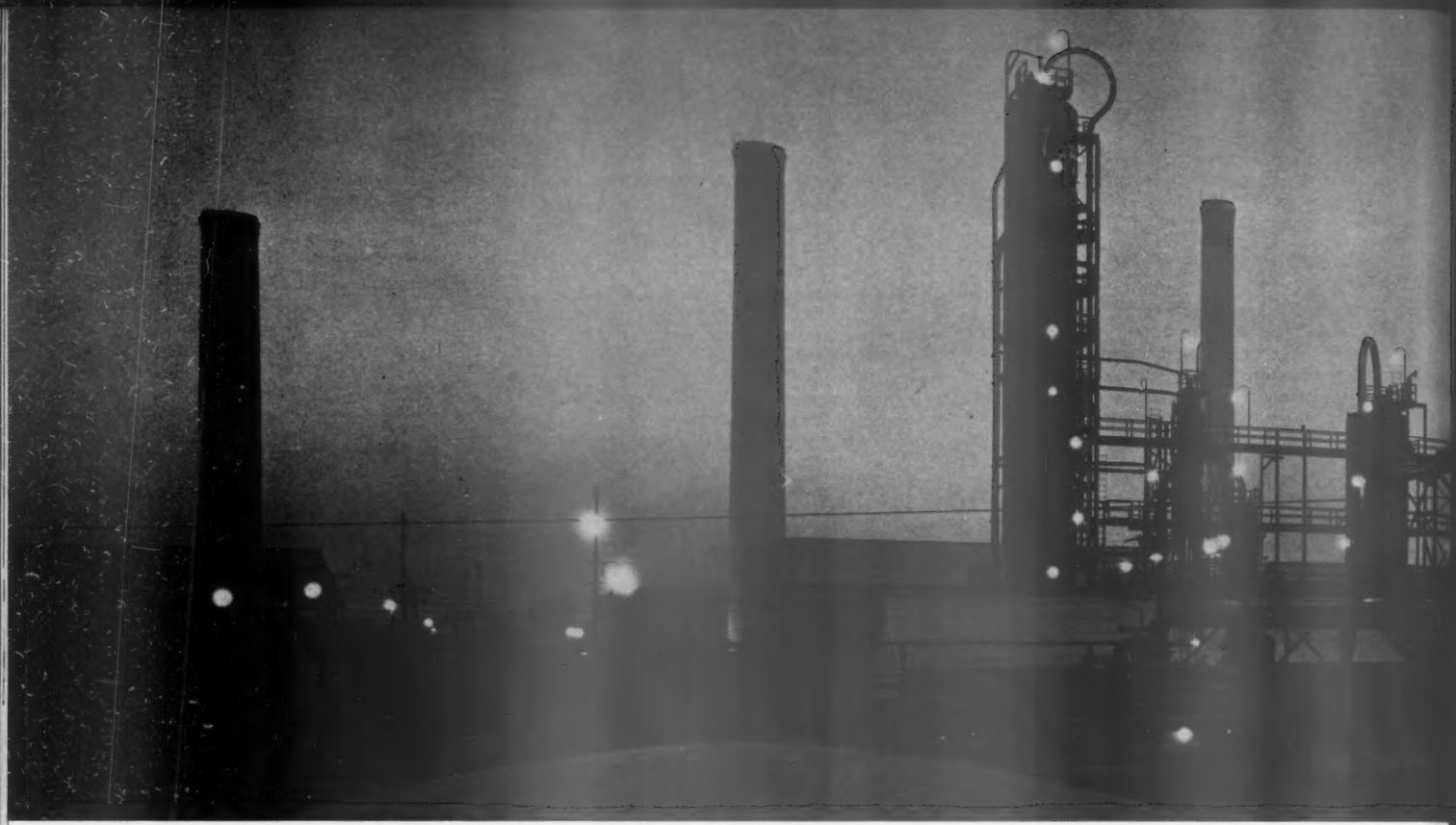
A single-line diagramatic layout of the bus arrangement and distribution system is shown on Page 74.

Plant Layout

The new plant as a whole has been designed for the greatest possible flexibility and availability. All auxiliary equipment possible including air heaters, forced and induced draft fans and drives, feed pumps, fuel oil pumps, booster pumps, blowdown exchangers, blowdown control, et cetera, will be located at ground level for ease of operation, control, and repairs. Practically all auxiliaries will be relayed with either duplicate equipment or steam-driven spares. Control of all equipment will be made available to the operator at the best vantage points, including control of motor operation of important valves. Parallel busses in the main switchgear will be duplicated in the 2,300-volt auxiliary gear and also in the 220- and 110-volt equipment to bring about greater reliability and continuity of service.

Actual construction is being prosecuted vigorously by the company at this time. The plant is expected to be completed and to go into operation in the late summer of 1939, and will permit shutting down two and possibly three of the present 150 pounds per square inch boiler houses.

Portion of distillation equipment in Raffineria de Napoli at Naples



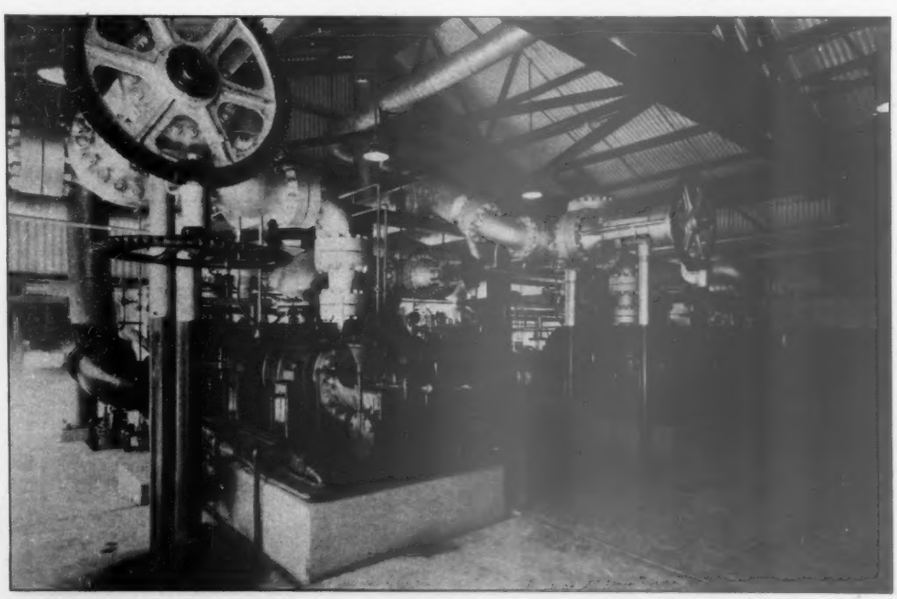
General view of Pure Oil Co.'s new 22,000-bbl. combination high-pressure unit at the

Increase Flexibility of

By CLYDE L. SMITH
Chief Process Engineer

As a part of a company-wide refinery modernization program, the Pure Oil Co. contracted late in 1937 for the construction of a large combination cracking unit at its Smiths Bluff, Texas, plant. This new unit was designed to process 22,000 bbls. of Van Zandt or East Texas type crudes per stream day or 17,000 bbls. per day of Gulf Coast crudes. Part of this crude previously had been processed on tube stills and outmoded cracking units. In designing the new unit for Smiths Bluff, consideration had to be given to the several types of crude oil available in the Texas-Louisiana area as well as to the character of products required by the company's marketing division. Construction of the unit was started in January, 1938, by the Lummus Co. as engineers and contractors, and the finished plant began operation in September, 1938, under a license from Gasoline Products Co.

The heaters are comprised of three multi-coil furnaces of Lummus design. The crude heater and viscosity breaker are included in the first furnace; a reformer and viscosity-breaking coil in the second furnace; and four coils for clean oil cracking in the third furnace. The second furnace may be used for light and heavy virgin gas oils when processing Gulf Coast crudes. The 135,000,000 B.t.u. clean oil furnace is the most interesting from the standpoint of size. It contains over 20,000 square feet of heating surface divided into four coils, each having identical operation conditions. The total circulation through these four coils is about 50,000 bbls. of hot oil per day. This furnace occupies a ground area of nearly 4,500 square feet, and requires 256 Maxon premix floor burners to supply the gas for combustion.



Main charging pumps

The tubes used in the radiant section of all cracking furnaces are of chrome-molybdenum alloy, the clean oil furnace tubes containing 2 per cent chrome and 0.5 per cent molybdenum. All fittings for the radiant heat tubes, excepting the crude heater, are of cast alloy steel containing 1.25 per cent chromium and 0.5 per cent molybdenum. Chrome-molybdenum alloys were also used in the furnace transfer lines and evaporator vapor lines. In operation, a close check has been maintained on the thickness of all lines, and where corrosion rates have been excessive, lines have been replaced with alloy material.

All towers supplied for the unit are fusion welded and conform to the latest requirements of the A.P.I.-A.S.M.E. code for unfired pressure vessels. The evaporators, high-pressure bubble

Smiths Bluff, Nederland, Tex., refinery. The plant was completed September, 1938

Pure Oil Co. Refinery

and C. R. WAGNER
Chief Chemist

tower, and stabilizer were radiographed and stress relieved. A corrosion allowance of 0.5 inch was applied to the shell, heads and nozzles of the evaporators and high-pressure bubble tower. A corrosion allowance of 0.2 inch was applied to the shell, heads, and nozzles of all other towers. The shells, nozzles and heads of the high-pressure evaporators were lined with 0.125-inch thick alloy steel lining of 11.5-14 per cent chrome and .12 per cent maximum carbon. Bubble trays and tray supports were given a liberal corrosion allowance. Chrome nickel alloy was used for the top decks of the crude flash tower. The bubble trays are the conventional Lummus type.

The crude flash tower is 11 feet in diameter and 91 feet high. It is provided with takeoffs and strippers to permit the manufacture of finished straightrun kerosene, and virgin furnace oil cuts, or the simultaneous manufacture of rubber-solvent, V.M.&P. naphtha, Stoddard solvent, and kerosene. Two 11-foot by 34-foot high-pressure evaporators are used, one receiving half of the clean oil heater output plus the main vis-breaker discharge, and the other receiving the balance of the clean oil heater output together with the reformer and heavy gas oil heater or secondary vis-breaker output. Both evaporators discharge into the main high-pressure fractionating column which is 11 feet 9 inches in diameter and 84 feet high. For the purpose of erecting the tower equipment, the Lummus Co. ran a spur track across the unit site. By means of a 155-foot mast and 138-foot boom capable of handling 250 tons on a 50-foot radius, all towers were lifted direct from freight cars to their foundations. Traffic experts advise that the high-pressure bubble tower, weighing 245 tons, is the heaviest single tower ever shipped across country by an American railroad.

The pumping equipment used on this unit is of particular interest. There are six multistage centrifugal hot oil pumps and 28 cold and hot oil pumps for various duties of which 26 are centrifugal. Only the fuel oil bottoms pump and the reformer quench booster pump are of the reciprocating type. One advantage of this type of equipment was immediately noticed upon starting operations, in that there was almost a complete absence of line vibration. The entire clean oil furnace charge of approximately 50,000 bbls. per day, hot, is handled by a six-stage Pacific pump discharging at 1,100 pounds pressure. This pump is driven by a Terry steam turbine which is capable of developing a maximum of 1,250 hp. The above main unit has a duplicate standby which is maintained warmed up ready for immediate operation. The vis-breaker pump is a six-stage Pacific centrifugal driven by a 450-hp. Terry tur-

Panel control for new combination high-pressure unit

bine and capable of putting up a 900-pound pressure when handling 18,000 bbls. per day of hot oil. The reformer pump discharges at 1,200 pounds and is driven by a 275-hp. turbine. The vis-breaker heavy gas oil and reformer pumps have a common standby. (The heavy gas-oil pump has a capacity of 10,000 bbls. of hot oil discharging at 900 pounds with a 275-hp. turbine drive).

All six of the multistage hot oil pump units are operated with 700 degree steam obtained from a separately fired superheater, and have a water rate varying between 11 pounds to 14 pounds per brake horsepower. The turbines all run condensing and the installation is unique in that each turbine has its own jet condenser.

The original specifications on the Pacific pumps called for minimum clearances for all pumps so as to minimize possibilities of seizure. These clearances were set well above present manufacturing standards and the satisfactory performance to date would appear to justify this departure.

Cold Seal Oil Test

All stuffing box troubles were reduced to a cold oil basis by using cold seal oil at 250-pound pressure for high-suction pressures and 60 pounds for low-suction pressure pumps. The stabilizer charge and propane reflux pumps have double dura-seals and utilize lubricating oil at a pressure above the pump suction pressure.

For condensers and coolers both shell and tube and submerged type units were used. All shell and tube type units were supplied according to a definite schedule specifying type of construction, fouling factors, etc. All units are single pass on the shell side in order to eliminate the use of horizontal baffles. All tubes are 1-inch O.D. and installed on square pitch to facilitate cleaning. Oil to oil exchangers have steel tubes with steel heads, and oil to water exchangers are equipped with red brass tubes and naval bronze tube sheets.

The submerged type coils are made up in removable bundles using 1-inch O.D. red brass tubes 22 feet long with cast iron or cast steel headers according to the type of service.

Steam Requirements

When operating near top capacity with a crude throughput of 25,000 bbls. per day, the unit requires from 55,000 to 60,000 pounds of steam per hour. By the installation of a waste heat steam generator, this steam load was handled without additions to the boiler plant. The steam generator, designed by the Lummus Co., consists of six vertical heat exchangers having a common steam drum. The treated feed water is passed through a preheater exchanger and fed to the steam drum as required. Circulation through the exchangers is maintained by the thermosyphon principle. Topped crude, fuel oil, and circulated reflux are used as heating media. This generator has produced as high as 40,000 pounds of steam per hour and averages better than 35,000 pounds of steam per hour at 150 pounds pressure.

Water requirements for condensing and cooling purposes are approximately 800,000 gallons per hour, with a 50° rise in water temperature. A forced draft cooling tower insures an ample supply of cold water regardless of climatic conditions. From 3 to 5 per cent of the amount circulated is required for makeup and this water is obtained from the Neches River on which the refinery is located when salt conditions will permit, and from water wells at other periods. When river water is used, it is coagulated by the use of alum and run to a settling tank before going to the circulating system. The circulated water is treated periodically with copper sulfate and potassium permanganate to prevent the formation of algae. The solid content of the water is watched closely and held to a low value by purging at intervals.

The accompanying flow sheet indicates the general plan of operation. As uniform quality of charge is always desirable on a unit of this type, the crude runs are planned for weeks in advance. If possible, the same crude is processed over an entire run. If this is not feasible, two or more crudes may be blended as run. This blending operation is carried out by using separate transfer pumps for each grade of crude. A master controller regulating the total feed operates reset mechanisms on the individual transfer pumps so that the same percentage blend is maintained.

A 10,000-bbl. crude surge tank adjacent to the unit prevents interruption due to power failures, and permits adjustment of the crude charge at the unit independent of the transfer pumps at the tank farm.

Path of Oil Charge

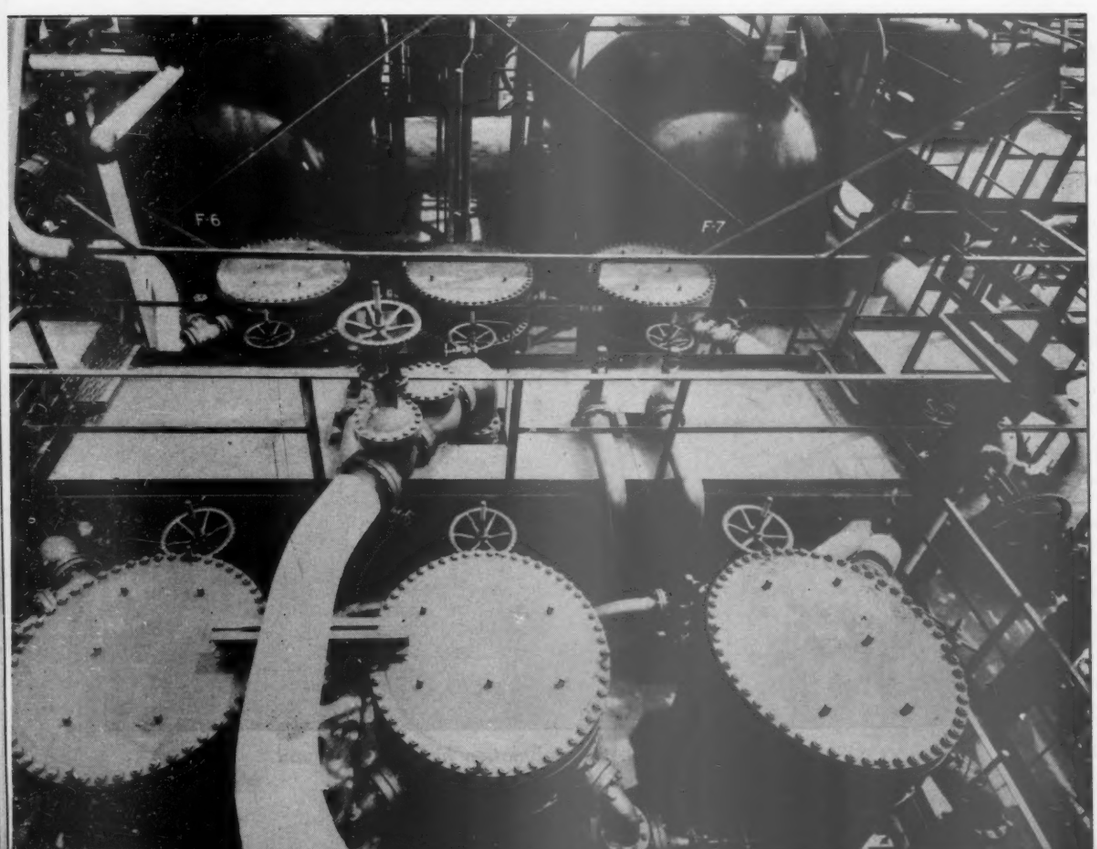
The crude charge is passed through several heat exchangers, where it is boosted to about 575° F. before entering the crude heater. The crude tower is operated at low pressure so that the desired fractionation may be obtained with low flash temperatures. As mentioned previously, the tower is normally operated to produce a straightrun gasoline overhead, but sufficient trays, takeoffs, and strippers are provided to permit the production of naphthas when desired. Reforming naphtha, kerosene, and virgin furnace oil may be produced as desired. Gas oil may be taken off as a side cut to be charged to the reformer coil or to the heavy gas-oil coil. The crude tower is controlled by circulated top reflux and also by intermediate reflux. The topped crude bottoms are pumped through crude preheating and steam generating exchangers to the top of the fuel flash tower. After acting as reflux in this tower and picking up heavy recycle flashed out of the fuel, the topped crude is drained off into a generous sized accumulator from which charge is taken for the vis-breaker coils. The vis-breaker coils are operated at approximately 890° F. outlet temperature and 225 pounds outlet pressure, according to the nature of the charging stock. The vis-breaker coils discharge into the high-pressure evaporators.

The bottoms from the evaporators pass first to an atmospheric stripper and finally to a vacuum stripper. Use of the vacuum stripper permits reduction of the fuel to low gravity and high viscosities. The high vis fuel is blended back to the desired viscosity for marketing by introducing a highly refractory cut taken as a side stream from the high-pressure bubble tower.

The high-pressure bubble tower operating at 220 pounds pressure receives the overhead from both evaporators. The fuel oil flash tower overhead is also pumped back to the high-pressure tower. The heat balance in this tower is controlled both by recirculated top reflux and circulated intermediate reflux, the circulated oils being used for various heat exchanger services. The bottom part of this tower acts as the accumulator for the clean oil heater charge. The clean oil charge is split into four streams by means of rate of flow controllers, each stream being held to a 600-pound outlet pressure and an outlet temperature of approximately 960° F. according to the cracking characteristics of the stock. All coil outlet temperatures are accurately controlled by Foxboro automatic firemen of the potentiometer stabilog type.

The straightrun gasoline is pumped into the stabilizer feed tank

Steam generator serving the new unit



from which the total gasoline output of the unit is charged to the high-pressure stabilizer. The stabilizer operation is conventional, but sufficient capacity has been allowed to give ample flexibility for seasonal demands.

The dry gas from the stabilizer fuel accumulator and stabilizer reflux accumulator is not processed further but is utilized as fuel at the unit or in the boiler plant.

New Unit

The new unit was first placed in operation on September 11, 1938. After a short "warming up" run during which the instruments were checked and various operations were adjusted, the unit was ready for its initial run. This run was started on September 21 and ended November 7, a 47-day run during which 1,007,685 bbls. of crude oil were processed on the unit. On subsequent operations the crude throughputs were increased to 25,000 bbls. per day with yields exceeding the initial results.

The initial run was conducted in two sections, the first producing 64-octane gasoline and the second 68-octane gasoline. Van Zandt crude was charged throughout the run.

On East Texas crude with a 25,000-bbl. per day charge, the unit has produced 70 per cent of gasoline when naphthas and kerosenes were not being manufactured.

The results of the official test run follow:

INITIAL RUN CHP-2 AT SMITHS BLUFF REFINERY.
YIELDS AND TESTS

	A	B
Average daily throughput, bbls.	22,253	19,991
Volume percentage yields:		
Gasoline	62.11	58.38
Fuel	32.92	33.23
Gas	7.02	9.63
Recovery	102.05	101.24
Tests on products:		
Gasoline:		
Gravity	62.8	63.4
Color	+22	+21
Initial	91	91
Per cent evaporated at 149	18.1	20.4
253	54.0	62.0
356	91.0	93.0
Endpoint	400	394
Reid V. P.	10.14	10.0
Oct.—A.S.T.M.	64.1	68.0
Oct.—L-3	65.2	69.2
Fuel:		
Gravity	8.25	7.9
Furol vis. at 122	267	269
P.M. flash	230	230
B.s.&w.	.45	.60
Sediment	.052	.087

Utilities

Sup. steam to turbines, lbs. per hr.	18,230	17,763
Fuel consumption (1,700 B.t.u. gas), cu. ft. per hr.	182,900	169,100
Cooling water M.—g.p.h.	461	391

Furnace Efficiencies

	Per cent
Reformer and virgin gas oil	70.5
Crude heater and vis. br.	70.2
Clean oil heater	70.2

SOUTH TEXAS

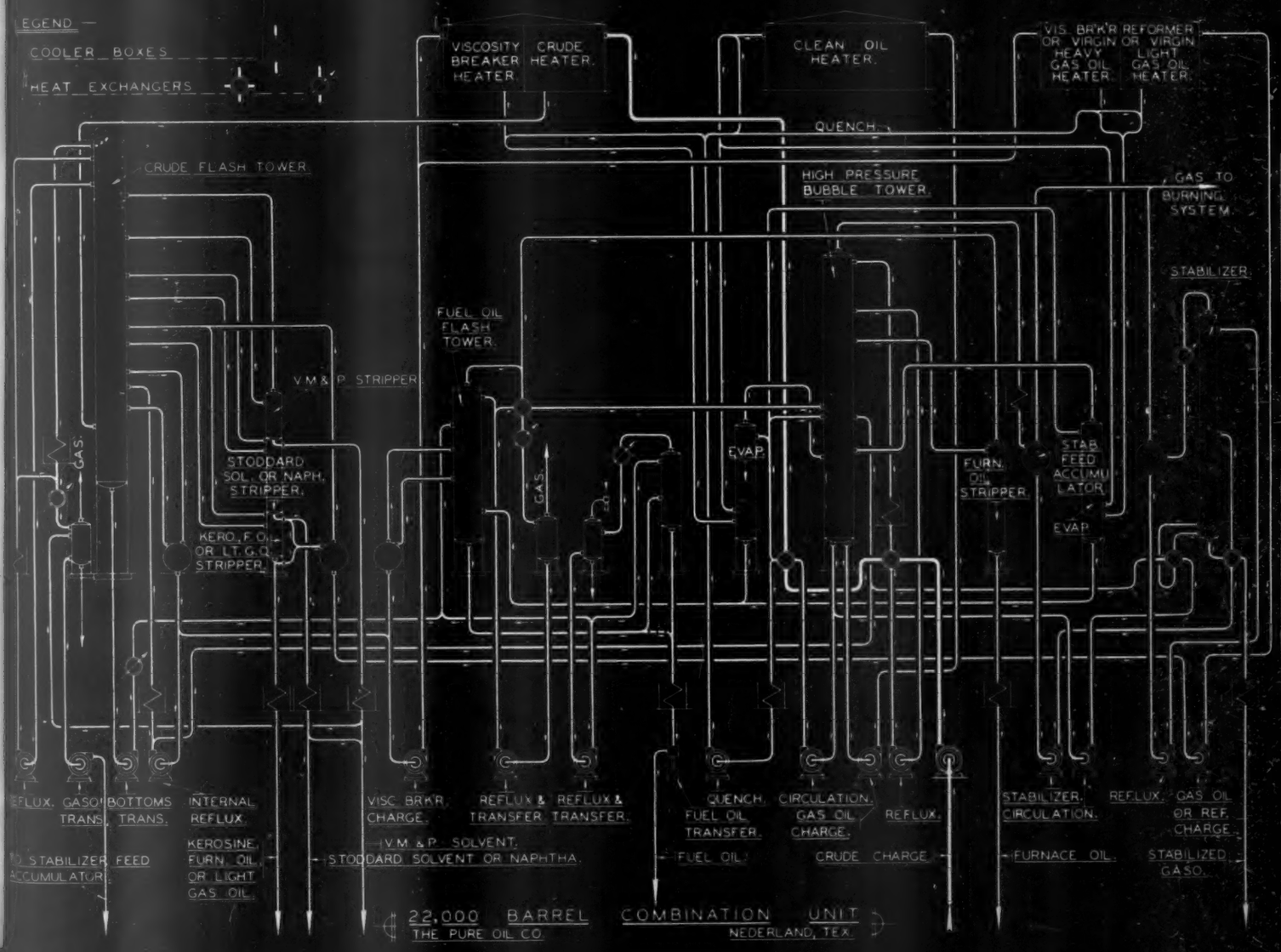
(Continued from Page 70)

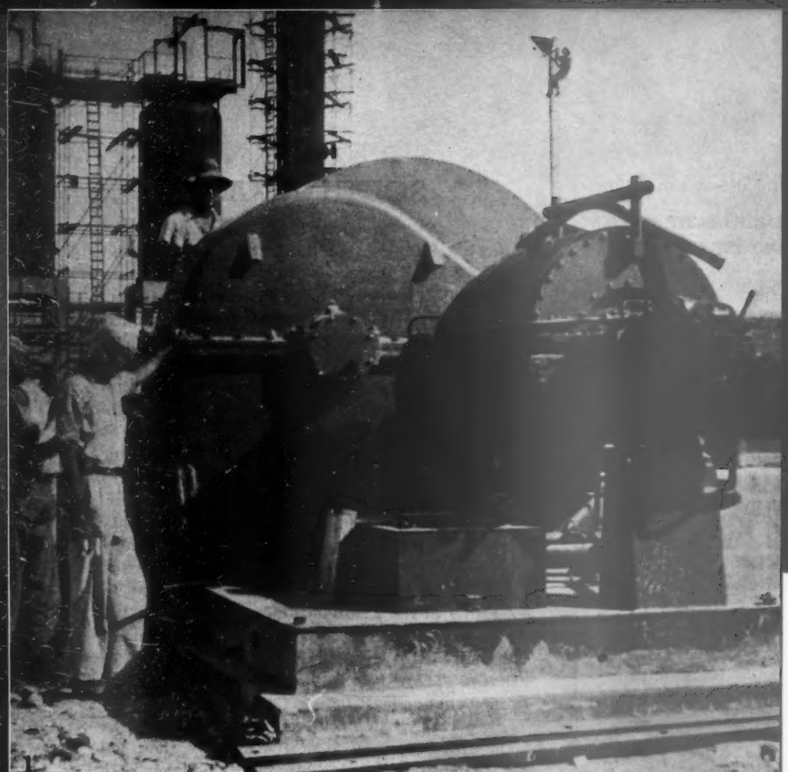
This is notably true of the Frio, Jackson and Yegua.

In the past three years the number of electrical logs available to the South Texas geologist had increased from approximately 500 to approximately 3,700. Also, more wells and better sampling of well cuttings have enabled the paleontologist to make greater contributions to the geologic knowledge of the area. As a result, subsurface correlations are rapidly becoming a matter of fact rather than a matter of opinion.

It has been found that many of the subsurface strata are folded and faulted to a degree that would have been unbelievable several years ago. The faults appear to be predominantly strike faults, downthrown toward the coast. Most of the faults in the Frio-Vicksburg trend and in the coastal area seem to increase in throw with depth and many have a maximum throw in excess of 400 feet. There is some evidence to support the opinion that at least one or two have a maximum throw greater than 1,000 feet. In the coastal area folds with reverse dips of 100 to more than 400 feet seem to be more common than uncommon. As a general rule the amount of folding increases with depth and in some cases there is a lateral shifting of the axis with depth.

Simplified flow chart of new 22,000-bbl. combination high-pressure unit built by the Pure Oil Co. at its Nederland, Tex., plant





Geared turbine-drive for hot-oil pumps being installed at Persian refinery

500 hp. and 700 hp. pipe ventilated motors driving hot-oil charging pump

REFINERY POWER

Before the advent of modern electric motors and control, designed to meet the hazardous atmosphere and corrosive element conditions encountered in refining operations, the use of steam drive predominated in petroleum refineries. As electrical equipment has evolved into forms particularly suited to the conditions of refinery service, electric power has assumed an increasing proportion of the refinery load. Motors are now available for explosion-hazardous locations in sizes up to 1,000 hp. and even larger, so that selection between turbine or motor drive becomes primarily a consideration of which form fits best into the picture of overall plant power economics.

The economic division between steam and electric power is a separate problem for each plant, determined largely by the demand for process steam particularly at low temperature levels, the availability of waste or surplus fuel, the characteristics of the driven equipment particularly as to speed control, the physical layout of the plant, and rate at which utility power can be purchased.

Refineries generally have an appreciable demand for process steam, usually at levels between 200-pound and 5-pound gauge pressure. The amount required varies greatly with different refinery processes, therefore flexibility in the source of steam supply is required.

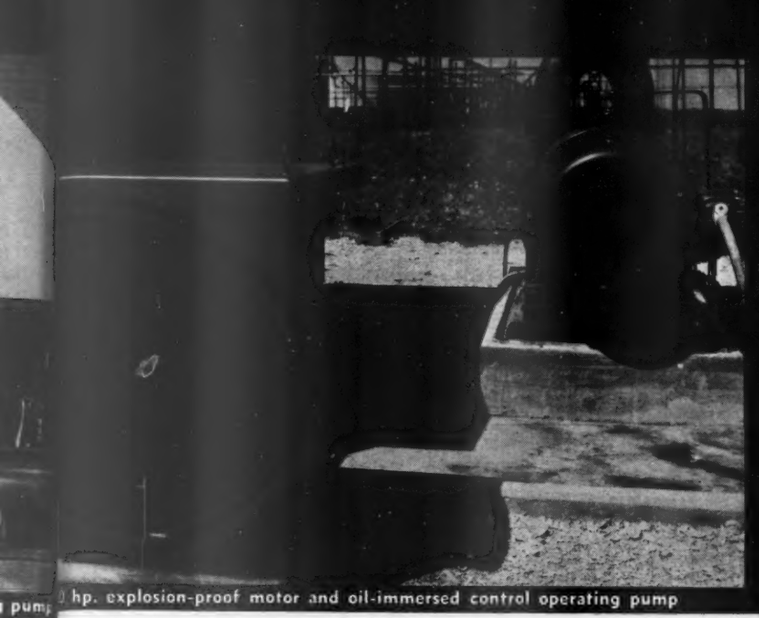
The plant requirement for process steam determines the concurrent power that can be developed economically by generating this steam at a heat level above that required for process. This power may be developed at the points of use in individual mechanical-drive turbines, or it may be generated in electric form in central turbine-generators and distributed to motors.

Either in conjunction with or aside from process steam requirements, steam may be produced from waste, by-product, or surplus fuels, and may be developed into power either in turbines at the location of the driven equipment or through turbine-generator with motor drive at the points of application.

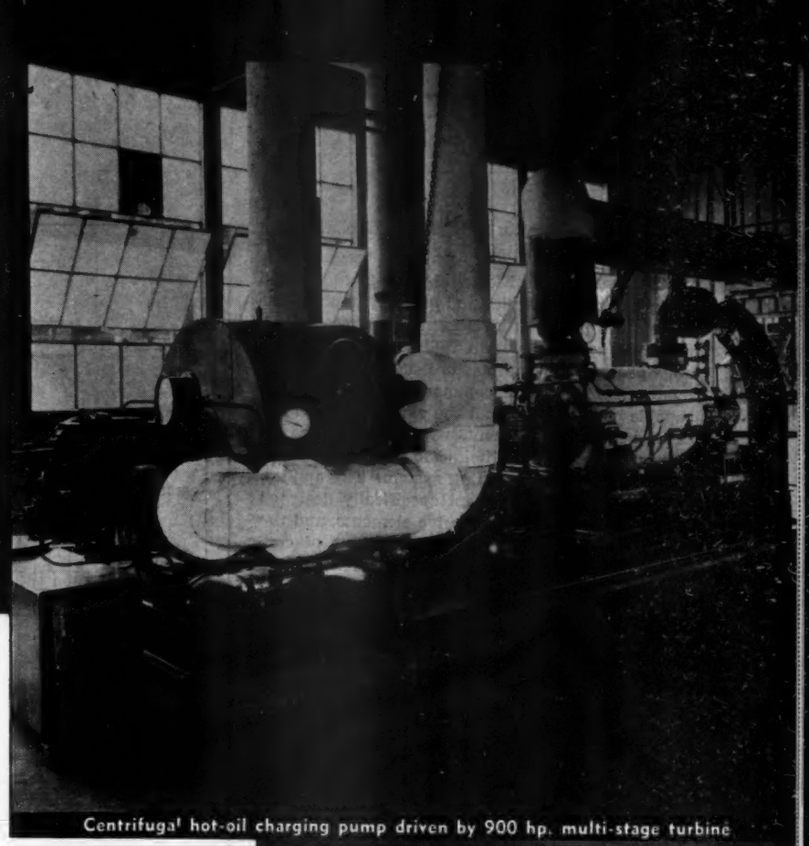
The industry also offers an example—in the Houdry catalytic cracking process—of power generation by gas of high heat content delivered from process at suitable head to utilize directly in a turbine. In this case the power produced by the turbine is delivered directly to a compressor employed in the process and excess power is

Turbine-driven centrifugal hot-oil pumps at refinery

Chillers driven by 5 hp. explosion-proof gearmotors



hp. explosion-proof motor and oil-immersed control operating pump



Centrifugal hot-oil charging pump driven by 900 hp. multi-stage turbine

R EQUIPMENT

By M. A. Hyde
Petroleum Industry Engineer
Westinghouse Electric & Manufacturing Co.

delivered to a generator connected into the plant electrical system.

There remains to be provided the power requirement beyond the amounts economically developed in conjunction with process steam or by waste or surplus fuel utilization. This additional power may be generated locally, which is likely to be economical where the necessary equipment represents a reasonable addition to power plant facilities already required, or it may be purchased from a public utility. The latter is desirable for two reasons whenever the preponderance of economic factors does not favor local generation. First, capital that would be diverted to power plant can be devoted to refining facilities. Second, administrative and operating effort can be concentrated to a greater degree upon the refining operations. It is reasonable to say that the refiner considers the generation of power only as an activity forced upon him by the economics of his situation, and one that he is anxious to minimize wherever possible in order that he may devote his organization, his plant and his resources to the primary objective—efficient manufacture of petroleum products.

Two 2500 kw turbine generators supply electric power and steam to refinery

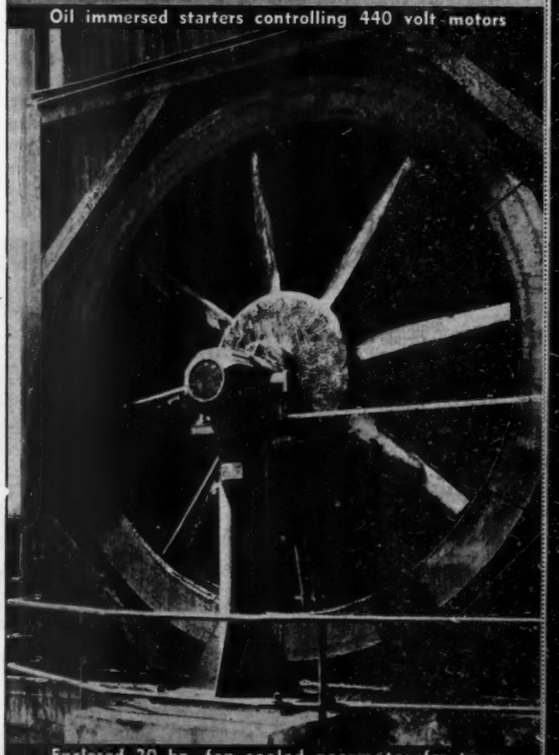
In a few cases to date the economics of process steam consumption and power supply have been handled satisfactorily by the location of a utility power plant at the refinery property, supplying both electric power and process steam. In other instances the establishment of a contract with the utility for interchange of energy to and from the refinery power plant has proved advantageous. The availability of a tie-in to an outside power supply increases the overall reliability of the refinery electrical system. Practices of this type are likely to increase, as there is much to commend them from the standpoint of efficient operation.

The result of the conditions outlined above is usually a division of the plant load between motor and turbine drive, using each type to the extent best fitting the overall plant economy, with consideration given to the particular requirements of the driven equipment when the application of each unit is made.

In the selection of motor or turbine drive for the individual loads, it is obvious that some must be motor driven. These are the small units—say below 25 hp.—and units located too far from the supply for economical transmission of steam.

Where (1) size and (2) location do not govern the selection, the majority of refinery drives may

Oil immersed starters controlling 440 volt motors



Enclosed 20 hp. fan-cooled gearmotor for tower

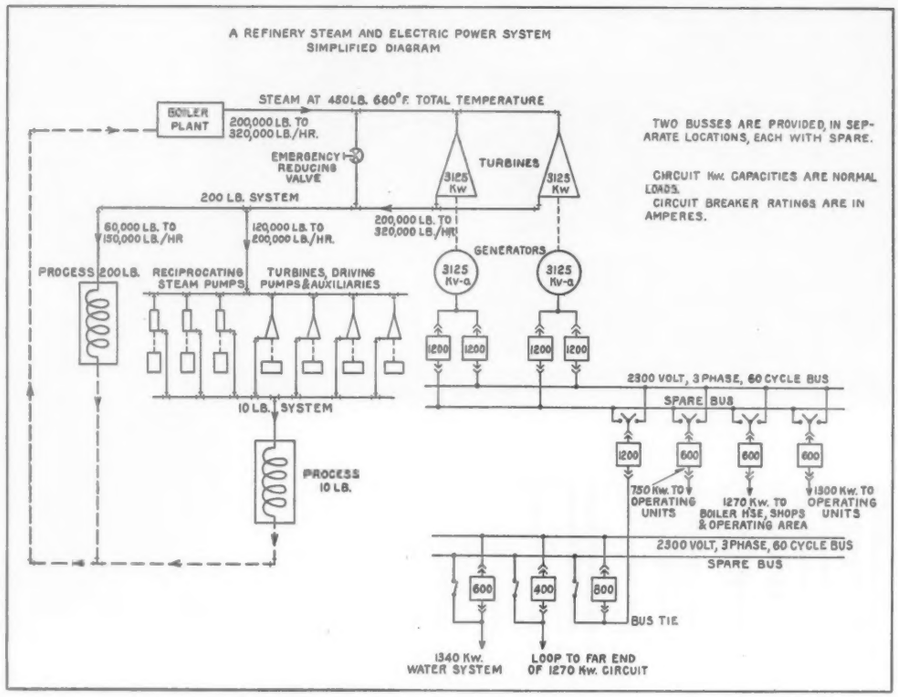
be either motor or turbine. The choice will then depend upon additional factors such as:

3. Maintenance. Electrical equipment, if well designed for this service and properly applied, has some advantages from the maintenance standpoint. If operated within rated load and reasonably protected from moisture and corrosive elements, motors of the commonly used forms are capable of life far beyond the expectancy of most other refinery equipment, with maintenance requirements ordinarily limited to periodic cleaning of windings and lubricating system. The application of insulation treatment specifically designed to resist moisture and corrosive elements, and the adoption to the greatest possible extent of construction materials resistant to corrosion are important factors in low motor maintenance. To realize corresponding operating on motor-control equipment, the oil-immersed forms are generally employed in this service.

4. Desirability of speed range. The turbine is readily adapted to operation over considerable speed range by the provision of a speed-changing device which operates to change the governor setting. On the other hand the squirrel-cage motor is inherently a constant-speed unit, and other motor forms provide adjustment speed only at the expense of simplicity.

5. Is the service continuous or intermittent? Most refinery equipment is on continuous duty for the duration of the run of the refining unit. From this standpoint motors and turbines are equally applicable. However, there are some drives which operate more or less intermittently and on these motors are preferable in that they require no attention at starting.

6. Importance of uninterrupted operation. The development of mechanical power directly from steam involves fewer steps and fewer links in the chain of apparatus than does using the steam for generation of electric power and then employing electric drive at the load. On this account it is desirable to utilize power steam produced locally primarily in those units where interruption entails the most serious consequences. For example in a cracking plant interruption of a pump charging oil to a furnace may cause coking of the furnace tubes with resultant extended delay for cleanout and perhaps serious damage to the equipment. A similar situation exists in the case of pumps charging hot oil to a cracking unit. While motors are used extensively on such drives on account of efficiency and low maintenance, many operators prefer turbines where the required steam is available, as providing the utmost in reliability. Some installations have been made using dual drive by motor and turbine, the turbine normally carrying the load and being governed at such speed as to automatically shift the load to the motor when the steam supply is inadequate. In other cases the pump is normally driven by the motor and the turbine is only of capacity to carry the unit at reduced speed with flow merely sufficient to prevent coking in case of interruption of the motor.



A refinery steam and power service layout

7. Explosion hazard. Motors and motor control have been developed in two general types for refinery service in hazardous atmosphere locations. One form as typified by the ordinary explosion-proof motor, is capable of withstanding an internal explosion without communicating flame to the surrounding atmosphere. The second type is designed to prevent access of explosive atmospheres to parts which operate with attendent arcing or to connections which may accidentally become loose and cause sparking or arcing. Examples of this second type are the oil-immersed motor controller, and the inert gas-filled motor. It may be said that motor and control equipment are obtainable in forms as explosion-safe as turbines. However, from the standpoint of ability of the medium itself to cause an explosion steam has an inherent advantage over electricity. The answer to this question lies in experience, and in this respect electrical equipment designed specifically for this service has given a good account of itself.

In motors of physical size greater than that corresponding to about 600 hp. 3,600 r.p.m. and above, relatively high costs are encountered in building a motor housing of suitable strength to withstand internal explosion and at the same time capable of transferring the loss heat of the motor to the surrounding air. This has led to the design of larger motors with built-in coolers ordinarily using water as the heat-removing medium. These coolers are located in the internal ventilating system, circulation of which is produced by a fan on the motor rotor. The internal-ventilating system may be filled with inert gas maintained under a low pressure to prevent infiltration of outside air. Motors of this type should be equipped with relays to operate an alarm or stop the unit in event of failure of cooling water or internal gas pressure.

Where nonhazardous ventilating air can be obtained reliably, many operators prefer the simplicity of the pipe-ventilated motor, which is merely an enclosed motor arranged with ducts to conduct the ventilating air stream to and away from the unit. Such an installation is feasible where the hazardous area is relatively confined and the ventilating air supply is definitely safe, a condition however that cannot be assured in many locations.

(Continued on Page 93)

TYPICAL MOTOR AND TURBINE APPLICATIONS

Application—	Typical hp.	Typical speed*	Motor types: For hazardous areas: Explosion-proof, 600 hp. and below	Inert gas-filled, above 600 hp.	Pipe ventilated	For nonhazardous areas: Splash-proof	Enclosed fan cooled	Turbine types: For continuous service—multistage	For intermittent auxiliary or standby service—single stage
Pumps, centrifugal:									
Crude charging	200- 500	3,600	D	D	D	..	..	D	D
Hot oil charging	250-1,200	3,600	D	D	D	..	..	D	D
Reflux	50- 200	3,600	D	..	..	D	..	D	D
Residue	25- 200	3,600	D	..	..	D	..	..	D
Transfer	10- 100	900-1,800	D	..	..	D	..	..	G
Cargo loading	100- 500	900-1,800	D	..	D	..	..	..	..
Water supply	100- 500	400-1,200	..	..	..	D	..	G	G
Fire	50- 300	1,800-3,600	D	..	..	D	..	..	D
General	3- 500	600-3,600	D	..	..	D	..	D or G	D or G
Pumps, reciprocating:									
Hot oil charging	100- 500	200- 400	G	..	..	G	..	G	G
Vacuum	15- 100	300- 600	G or GM	..	..	G or GM	..	..	..
Pumps, rotary	25- 200	900-1,200	D	..	..	D	..	G	G
Blowers	25- 150	400- 900	D	..	..	D, B or G	..	G	..
Cooling tower fans	10- 30	250- 450	..	..	..	..	GM	..	..
Compressors, reciprocating	25- 400	150- 400	..	..	D (Syn.)	B	..	..	..
Chillers	3- 10	15- 25	GM	..	..	..	..	..	..
Filters	3- 20	10- 50	GM	..	..	..	..	..	..
Centrifuges	2- 7½	3,600	B	..	..	B	..	..	..
Valves	¼- 2	900-1,800	D	..	..	..	D (Enclosed)	..	..
Material handling	2- 50	....	D	..	..	B, GM	..	..	..

Symbols: D = Direct drive. GM = Gearmotor. Syn. = Synchronous motor. G = Geared. B = Belted.

*Speeds are given as nominal speed at input shaft of driven machine, i. e. as pinion speed for machines comprising gears.

TORSION-CONE CONSISTOMETER

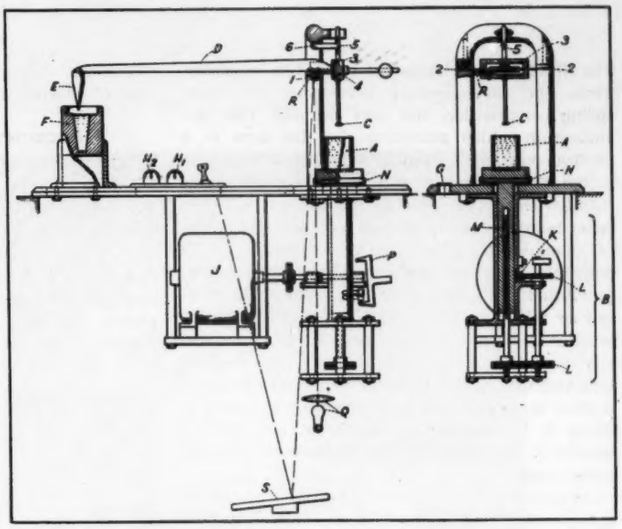


Fig. 1—Torsion-cone consistometer mechanism

By M. H. Arveson and L. C. Brunstrum
Standard Oil Co. (Indiana)

The wide variation in the consistency and structure of lubricating greases has led to the use of numerous instruments for controlling uniformity, among which are the MacMichael and Stormer viscometers and their modifications, the Gardner mobilometer, the A.S.T.M. cone pentrometer[1] and the Consadometer[4]. In addition the Saybolt Universal Furol and other capillary viscometers are sometimes used for fluid greases. These unrelated systems of measurement are usually limited to a narrow class of grease, thus complicating the problem of controlling grease consistency.

Commonest of these devices is the A.S.T.M. cone penetrometer (D217-33T) which is used on the heavier lubricants such as fibre and cup grease. Even this widely used instrument has several disadvantages: (1) Its range is not wide enough to include the softest cup greases, (2) it requires almost one pound of grease, and (3) inaccurate results may be obtained on fibre and very heavy cup greases. The first and second may be avoided by the use of a lighter or smaller cone respectively, but, satisfactory as these special methods are for their narrow purpose, they actually complicate the wider problem of grease standardization by introducing two more uncorrelated measurements.

Design

In an attempt to provide a single instrument which would have none of these disadvantages, it was decided to utilize the principle of measuring the force required to push a disc through the grease. It will be noted that this is analogous to the old-fashioned finger test for consistency. By using a suitable mechanical means for forcing the disc through the grease, materials of a wide consistency range can be tested and the problem resolves itself to one of measuring the forces involved.

It has been shown previously (2), (3), that the relationship between soap content and stress (dynes/sq. cm. required to force grease through a capillary) would require a wide range or scale. The following data taken from those published illustrate this range:

Per cent soap	Stress
0.0	0.12
3.0	22.0
6.1	180.0
10.1	940.0
13.6	4,200.0
18.8	6,200.0
22.5	11,000.0

Here the approximate relation is, Stress = 0.9 (soap per cent)[3]

A similar relationship was found between force and soap content using the disc principle referred to and a chainomatic balance to measure the force. A disc 1 square centimeter in area and a grease cup 4 centimeters in diameter and 5 centimeters deep were arbitrarily selected. The force required to push this disc at the midpoint in the cup into a series of lime soap greases is as follows:

Per cent soap	Force in grams
4.8	6
8.8	25
13.0	75
16.0	125
17.5	150
20.6	250

In this case the approximate relationship is, Force = 0.035 (soap per cent)[3]

It is obvious that a linear scale, such as is obtained with springs, leaves much to be desired. In fact a scheme depending upon interchangeable spring reactants was considered, but was discarded to avoid the necessity of interchanging parts when testing grease of different consistencies. A scale which is proportional to the cube root of the force required to push the disc into the grease would condense the scale and have the additional advantage of being directly proportional to the soap content of the grease.

The buoyancy of an inverted cone offers this counteracting force and is proportional to the cube of its linear submergence. Furthermore, it is an easily constructed and reproducible shape. Accordingly an instrument was developed in which a cone submerged in mercury balances the force. This instrument is known as the torsion cone consistometer and the value obtained thereby is called the consistency index. The consistency index of a grease is a number 100 times the cube root of the force in grams required to cause a disc 1 square centimeter in area moving at the rate of 18 millimeters per minute through a cup of grease 4 centimeters in diameter and 5 centimeters deep at the midpoint. Except for resistance of the balance supports, inaccuracies in the cutting of the cone, etc., the deflection of the instrument is directly proportional to this value. By direct weight calibration, the relation between the deflection on the particular instrument and the consistency index is determined.

The instrument has been built in two forms, Type A, in which the disc is moved into the cup of grease and Type B, in which the cup of grease is moved against the disc. Either form gives the same results, but the latter design has certain advantages including greater simplicity in operation, greater sensitivity, neater construction and better temperature control.

Fig. 2—Type B torsion-cone consistometer

Description of the Operation and Construction of the Torsion-Cone Consistometer Type B

The following description refers to items in Figure 1. Cup *A* is moved upward at a constant rate by the motor-driven mechanism *B*, below the table, against the disc *C*, the force being transmitted through balance arm *D* to cone *E*. The force applied at *C* is counteracted by the buoyance of cone *E* as it is depressed into mercury in cup *F*. The deflection of the beam *D* under the force applied is read on scale *G* after being magnified through the optical lever system. Deflection becomes constant near the center of the cup, 2.5 cm. penetration of the disc. This reading is taken as the consistency. Light H_1 signals the arrival of the disc at the center and the motor is automatically stopped. Light H_2 may be connected to flash every revolution of the screw (1 mm. movement of the cup) if the deflection at any penetration is desired or if a comparison of penetration-deflection curves of various greases is to be made.

The balance is suspended on watch spring *1* which is clamped in the stirrup at *2* and to the balance arm. The disc C is attached to frame *3* which in turn is clamped to another spring at *4*.

The tip of arm *D* clamps this spring in its center. Thus, the force-carrying pivots are of watch spring construction and very durable. The parallelogram which maintains the disc arm in a vertical position is completed by pivots at points *5* and *6*. The motor *J* moves the platform *N* through the worm gear *K* and the gears *L*, the latter being necessary only as a convenient means of changing the speed, if this should ever be desirable. Since the platform is keyed to the base, revolution of the screw *M* causes the platform to rise or fall. A projection of the platform causes lever *P* to operate a toggle switch that automatically stops the motor at both ends. A crosshair lens and filament at *Q* focuses an image on scale *G* after being reflected by the mirrors at *R* and *S*. Since *R* is fastened to the beam any motion thereof is magnified by the displacement of the scale image.

It should be noted that the cup is mounted on a removable counter-sunk disc. This disc may be replaced with a metal cup or jacketed vessel for temperature control when measurements are desired at temperatures sufficiently removed from normal room temperature to warrant such precautions.

Provisions are made in the motor-driven mechanism to operate the two signal lights and to stop the motor at either end of the stroke. The only operation necessary to start the instrument is to throw the switch to the upward position for taking the measurement and then when the measurements are complete throw the switch in the opposite direction to return the cup to the starting position.

The procedure employed in testing a sample of grease is as follows: The sample is taken from the container or mixer and placed in cup *A* with a minimum of disturbance. The cup is placed in a thermostat until the desired constant temperature is reached. The sample is then removed and placed on the platform and the switch thrown. The cup of grease moves toward the disc and after contact is made the deflection is noted on scale *G*. After the disc has penetrated 1.5 to 2 cm. the deflection is noted continually until light H_1 signals that it has reached the center of the cup. Several readings, rather than a single one, are taken in order that irregularities, caused by extraneous vibrations or irregularity in the sample, may be eliminated by taking the average of several values. The reading obtained is referred to a calibration chart from which the consistency index is read. Light H_1 remains on until the switch is thrown in the opposite direction, whereupon the cup returns to its original position and stops.

Calibration

The motor-driven mechanism of the original instrument, Type A, drives the disc into the grease sample, which is supported on the balance. This type is calibrated by addition of weights to the balance pan. Type B must be calibrated by applying an upward force to the disc. This is accomplished by using an analytical balance, placing weights in one pan while the other acts against the disc. The calibration curve is obtained by plotting the millimeters of deflection against the cube root of the force multiplied by 100. Since this relation is approximately a straight line it is possible to rule a special scale of uniform gradation and thereby make the instrument direct reading. Since the deflection has a linear relation to soap content it would be possible to calibrate the instrument to read in terms of per cent soap. For example, a reading of 165 would mean approximately 16.5 per cent of soap.

Our experience with Type A instrument over a period of six years with frequent calibration checks demonstrated that the original calibration curve still holds, indicating the reliability and ruggedness of construction.

Accuracy and Reproducibility

The data in Table 1 are presented to show the accuracy and reproducibility of the instrument. The values in Column 1 were obtained on six portions of a sample of petrolatum cast from the molten state under rigidly uniform conditions. By this means it is possible to obtain check samples that are more uniform than samples of the same grease. The results in Column 2 were obtained on a softer material containing substantial quantities

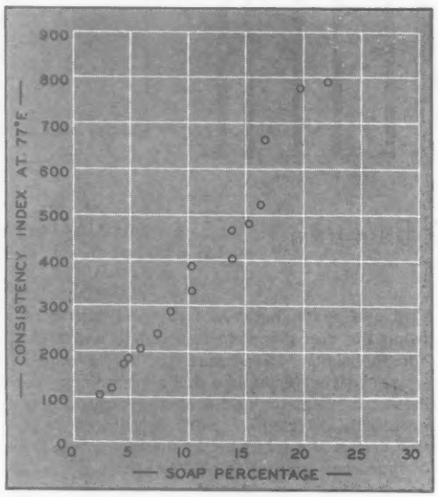


Fig. 3—Relationship between soap content and consistency

of petrolatum and other ingredients and was likewise cast from the molten condition.

TABLE 1

Test number—	Consistency index— Column 1	Column 2
1	444	223
2	444	223
3	444	219
4	444	217
5	443	217
6	443	...

The data in Table 2 were obtained on four different samples of grease and indicate the degree of reproducibility that may be expected on cup greases. Note by comparison that the greases give a lower degree of reproducibility. This difference is due to unavoidable irregularities in sampling technique, a problem ever present in consistency measurements regardless of the instrument. These values were taken on worked greases prepared in the A.S.T.M. grease worker.

TABLE 2

Test number—	Consistency index— Grease A	Grease B	Grease C	Grease D
1	393	161	169	494
2	394	161	170	496
3	404	163	170	494
4	...	...	...	502
5	...	...	...	500
6	...	...	...	498
7	...	...	...	496
8	...	...	...	496

Application

The torsion-cone consistometer has been used as a plant control instrument for the standardization of soda soap greases for six years. It is also used for many lime-soap greases, especially those that are too soft to be tested on the penetrometer. The relationship between consistency at 77° F. and soap content of various commercial greases is shown in Figure 3. These data include products which differ both as to kind of soap and viscosity and kind of oil so that the departure from an exact linear relationship between soap content and consistency index is to be expected. The data are mainly significant for showing the range in consistency index ordinarily involved in practice.

Gear and transmission lubricants too soft for the cone penetrometer have a consistency index of 100 to 200. Medium wheel bearing grease falls within the range 350-400. Typical products falling at the upper end of the range are very hard fiber greases and the hardest conventional cup greases.

The instrument is well adapted for testing at temperatures varying widely from room temperature and is therefore very useful for laboratory studies.

Summary

An instrument for measuring the consistency of petroleum lubricating greases has been designed. The torsion-cone consistometer, consisting of a torsion balance with a submerged cone reactant which measures the force applied when a cup of grease is moved against the disc, has been described in detail. Data have been presented to show the accuracy and reproducibility of the instrument. Six years of experience with the use of this instrument in control and development work testifies to its utility and ruggedness.

The torsion-cone consistometer has been shown to have the following advantages as a control instrument:

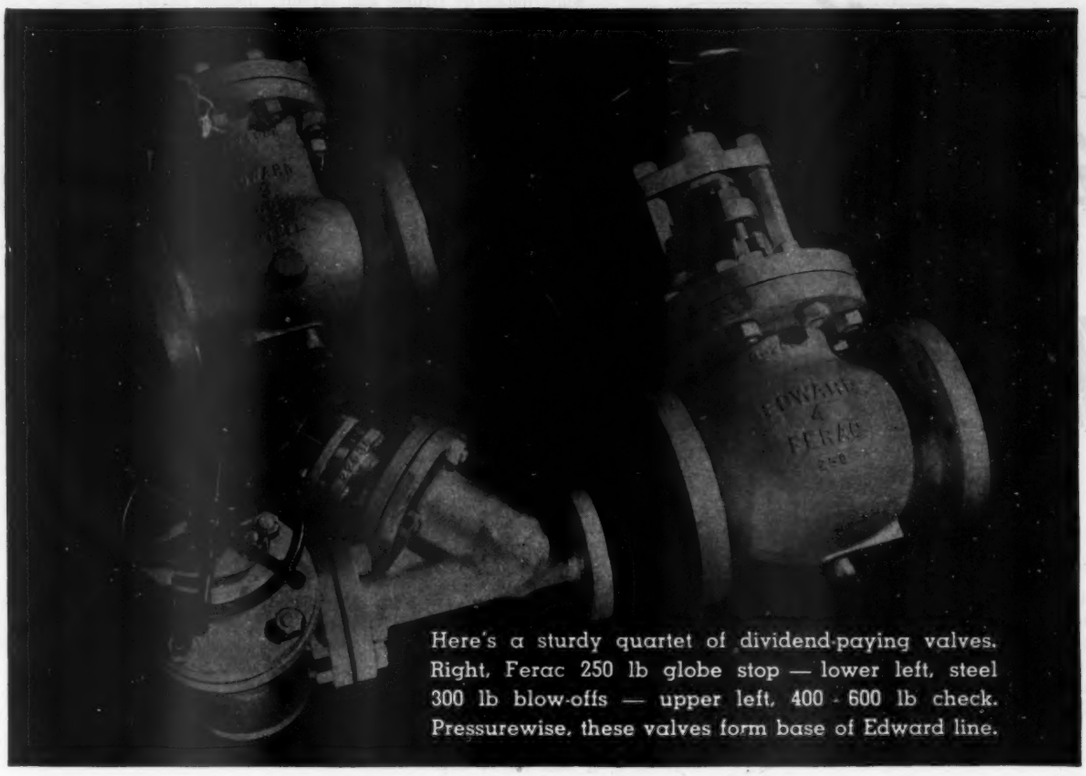
1. Simplicity of operation.
2. The instrument is subject to direct weight calibration.
3. The range of consistency measurable is very wide and the values employed are rational in comparison with trade consistency standards, being approximately a linear function of the soap content.
4. The standard cup is easily reproducible. The cups can be made in quantity and used for batch and retained samples.

The principle of the torsion-cone balance should be valuable in the design and operation of other instruments for force measurements, e.g., tensile and binding strengths of structural, textile and other materials.

1. A.S.T.M. Standards on Pet. Prod. and Lub'ts, D217-33T.
2. Ind. Eng. Chem., Vol. 24 (Jan. 1932), p. 271.
3. Ind. Eng. Chem., Vol. 26 (June 1934), p. 628.
4. Nat. Pet. News, Vol. 29, No. 42 (Oct. 20, 1937), p. R269.

Mineral Valuations of the Future

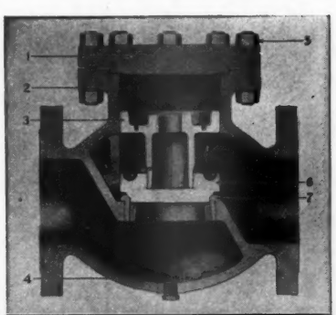
Many in the oil industry are naturally concerned with the problem of forecasting the future trend of prices for crude oil and estimating the reserves of petroleum. These problems concern many fundamental factors that are influenced by technologic, commercial, political, and social factors and are therefore governed by the same general factors which affect all minerals. For these reasons the latest book in the A.I.M.E. series entitled "Mineral Valuations of the Future," by C. K. Leith, professor of geology, University of Wisconsin, should be of much interest and value to many in the oil industry. The book treats of the significance of mineral values, new conditions affecting mineral values, methods of valuation, tonnage of quantity estimates, future annual production, the time element—life and deferment cost, selling prices, profit, rate of return in the mining investment, scarcity values and conclusion as to the future of mineral values. All of these phases of this general subject are of interest to the oil industry and oil is mentioned along with other minerals. The book contains 116 pages. It is available to nonmembers of the A.I.M.E. at $1.50 and members $1 per copy.



Here's a sturdy quartet of dividend-paying valves. Right, Ferac 250 lb globe stop — lower left, steel 300 lb blow-offs — upper left, 400 - 600 lb check. Pressurewise, these valves form base of Edward line.

Some Would Call 'Em

HIGH PRESSURE VALVES



Cross section of typical Edward non-slam horizontal check valve. Body (4) of fine cast metal, cover (1) forged steel, fitted piston (3) with forged EValloy (6, 7) disk and seat. Piston operates in smoothly finished body neck (2), avoiding heat expansion problems related to inserted liner. Disk guided throughout travel by three non-clogging ribs. Fully threaded alloy studs (5) with A.S.T.M. specification nuts used for 250 lb as well as higher pressure lines.

• • •

THE EDWARD VALVE & MFG. CO., INC.
EAST CHICAGO INDIANA

STRICTLY speaking, that's what they are, the Edward 250 & 300 lb (primary steam rating) valves, even though they are the two lowest pressure groups in the Edward family. When you talk high pressure to an Edward man he thinks of 1500 lb (steam) or 10800 lb (hydraulic) valves which are stocked in the bins. Be that as it may, Edward valves are all blue bloods. There's not a point of essential difference, except weight and dimensions, between the 250 - 300 pounders and their top pressure-temperature brothers. Cut shows 3" 400 lb check which is same as 600 lb.

Edward Ferac (high strength iron) and Edward 300 lb (steel) lines are associated because dimensionally they are alike. If it's steel you want, these valves, measured by any yardstick, have everything. But often Ferac is just the material to serve your needs.

Re-styled in recent months — some of the important changes not visible to the eye — these valves are self-evident class.

ADD UP THEIR POINTS — EValloy seats, disks and non-return piston rings — castings carefully correlated as to chemicals and physicals — heat treatment under rigid laboratory control — contours cleverly formed to minimize efficiency-reducing eddies — disks guided by self-scouring ribs — high precision inspection — simplicity and strength — and you have to pronounce them real valves.

EDWARD VALVES

Catalytic Refining Methods

By V. N. IPATIEFF

In recent years two catalytic methods have become available for the synthesis of aliphatic hydrocarbons. The first of these consists in the polymerization of olefins to yield higher homologs which may, if such is desired, be readily hydrogenated to produce paraffins. The second consists in the alkylation of paraffins with olefins, a reaction which had long been considered impossible because of the inertness of saturated aliphatic hydrocarbons.

The development of catalytic polymerization of olefins to the stage of commercial usefulness is one of the most important achievements of petroleum technologists. Numerous polymerization plants are at work today in refineries both large and small, producing valuable polymer gasoline.

The history of this development is interesting, but because much of it has been told, it must take a position farther along in this article while I introduce the little known subject of alkylation.

Alkylation is likely to be the next great forward step in hydrocarbon synthesis for the production of more and better motor fuel.

Alkylation of Paraffinic Hydrocarbons

Although the alkylation of aromatic hydrocarbons has long been the subject of extensive study, it is now only six years[1] since we found for the first time that paraffins, too, may be made to react with olefins to yield products of alkylation, namely, higher paraffins. The reaction is catalyzed by metal halides.[8,9] It should be noted that this alkylation of paraffins has an advantage over the alkylations of the Friedel-Crafts type in that the alkylating agent is not an alkyl halide but an olefin. It is obvious that the controlled alkylation of paraffins offers an excellent means for the synthesis of various paraffin hydrocarbons. It has a distinct advantage over the polymerization-hydrogenation method, in that it accomplishes the same end in a single step, making the hydrogenation process unnecessary.

$$C_nH_{2n+2} + C_mH_{2m} \rightarrow C_{n+m}H_{2(m+n+1)}$$

The probable mechanism for the reaction may involve the reaction of the paraffin with an aluminum chloride olefin complex. Thus:

$$AlCl_3 + C_2H_4 \rightarrow ClCH_2CH_2AlCl_2$$

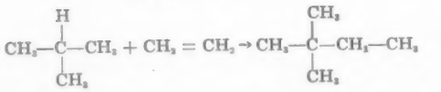
$$(CH_3)_2CH + ClCH_2CH_2AlCl_2 \rightarrow (CH_3)_2CCH_2CH_2AlCl_2 + HCl$$

$$(CH_3)_2CCH_2CH_2AlCl_2 + HCl \rightarrow (CH_3)_2CCH_2CH_2 + AlCl_3$$

The alkylation of isobutane with ethylene may be taken as an example. This reaction was studied in some detail by Grosse and myself using boron fluoride as catalyst, and by Pines, Komarewsky, Grosse, and myself, using aluminum chloride as catalyst. At room temperature and an ethylene pressure in the presence of aluminum chloride, the products shown below were received.[10] (Practically the same results were obtained with boron fluoride catalyst.)

Product—	Vol. per cent yield
Isopentane	16.0
Hexanes	41.0
Heptanes	9.4
Octanes	12.3
Nonanes	6.5
Higher paraffins	14.8

The hexanes are, of course, the primary products of the reaction. This isomer expected in largest amount is 2,2-dimethylbutane formed according to the following equation:

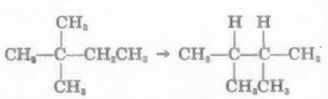


Another isomer, namely 2-methylpentane, formed by condensation with one of the primary carbon atoms of the paraffins would be expected in lesser amount.

Actually, it was found that neither of these products was the predominating one. Approximately 80 per cent of the hexane fraction was 2,3-dimethylbutane, 18 per cent was 2-methylbutane and only 2 per cent was 2,2-dimethylbutane.

The underlying principle employed in the analysis of the hexanes may be of interest here. Bromination of 2,3-dimethylbutane in sunlight yields a crystalline dibromide, 2,3-dibromo-2, 3-dimethylbutane, whereas under the same conditions 2-methylpentane yields only liquid products and 2,2-dimethylbutane does not react at all. There is thus available[11] a simple method for the characterization of the various hexane fractions obtained by careful fractionation.

That 2,3-dimethylbutane cannot be a primary reaction product is obvious. The mechanism for its formation is, perhaps, equally obvious. 2,2-Dimethylbutane, which is a primary product, isomerizes under the influence of the catalyst to yield 2,3-dimethylbtane.



Similar isomerizations have been shown to occur in the presence of aluminum chloride.

The formation of isopentane was undoubtedly due to another secondary reaction, autodestructive alkylation. This reaction, which is the basis for the cracking of petroleum with aluminum chloride, was elucidated by my coworkers and myself in 1936.[12] The action of the aluminum chloride results in the splitting of the paraffin into a lower paraffin and an olefin in statu nascendi. The olefin may then either alkylate the original paraffin to yield a higher paraffin or react with the aluminum chloride to form the complex addition compounds which make up the so-called lower layer.

$$C_{k+2}H_{2(k+1+1)} \rightarrow C_kH_{2k+2} + C_4H_{22}$$

$$C_{k+1}H_{2(k+1+1)} + C_4H_{22} \rightarrow C_{k+22}H_{2(k+22+1)}$$

Applying the reaction to the case of the octane formed during the reaction of isobutane with ethylene:

$$C_8H_{18} \rightarrow C_5H_{12} + [C_3H_6]$$

$$C_8H_{18} + C_3H_6 \rightarrow [C_{11}H_{24}]$$

Or, the net effect:

$$2C_8H_{18} \rightarrow C_5H_{12} + C_{11}H_{24}$$

Another possible source of by-product isopentane in the alkylation of isobutane with ethylene are given by the following:

$$C_4H_{10} + [C_2H_4] \rightarrow C_7H_{16}$$

and

$$C_7H_{16} \rightarrow C_5H_{12} + [C_2H_4]$$

$$[C_2H_4] + C_4H_{10} \rightarrow C_6H_{14}$$

or, the net effect:

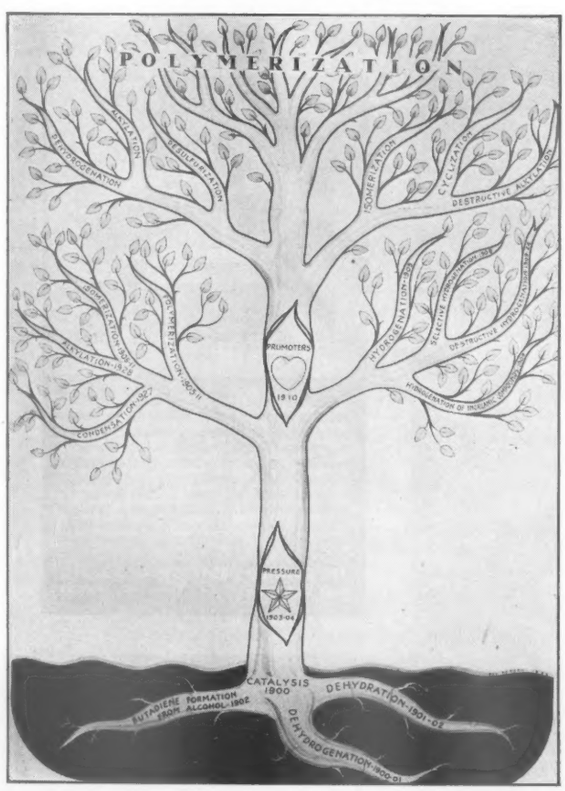
$$2C_4H_{10} + [C_2H_4] \rightarrow C_5H_{12} + C_6H_{14}$$

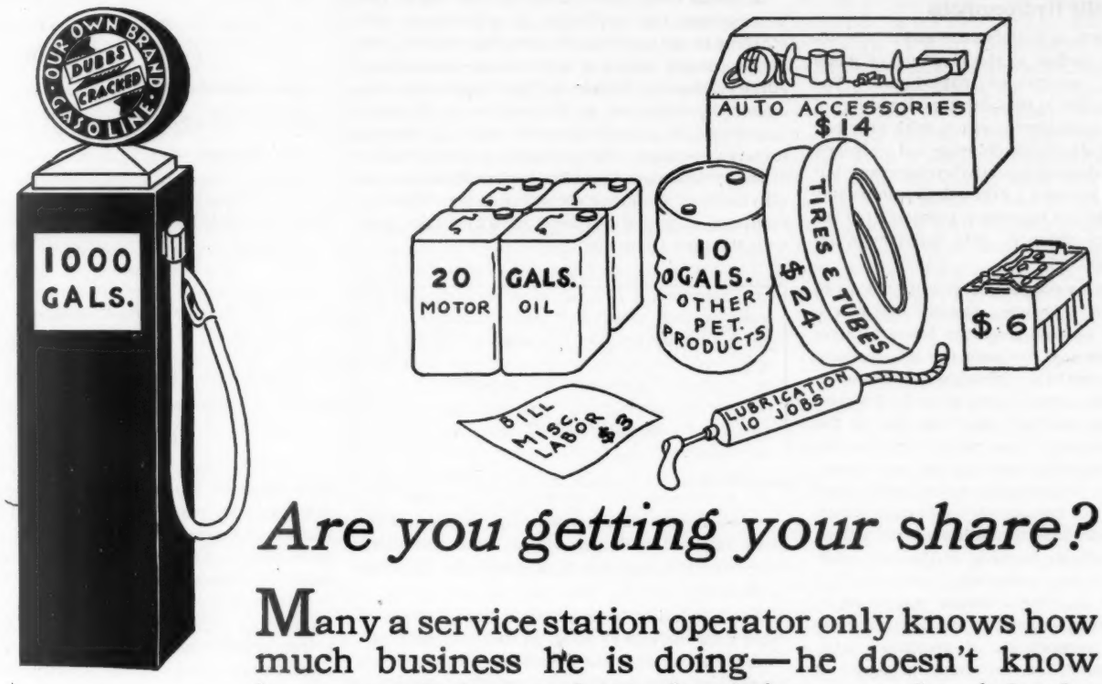
Isobutane has also been successfully alkylated with propene and the butenes.[1] The reaction with *n*-butene is important since a 65 per cent yield of octanes, chiefly 2,2,3-trimethylpentane, may be obtained.

Other paraffins such as *n*-butane, the pentanes, and the hexanes, have also been alkylated with the various olefins.[1] By means of proper choice of the conditions, it is possible to obtain more or less satisfactory yields of the desired paraffins.

The alkylation of propane has not yet been accomplished. As will be shown below, this is probably due to its lack of a tertiary carbon atom as

Steps in growth of catalysis





Are you getting your share?

Many a service station operator only knows how much business he is doing—he doesn't know how much he ought to be doing—and might be

Do you know?

PETROLEUM MARKETER has figured it out for you

Here is the yardstick it offers:

If you are pumping a thousand gallons of gasoline a month you ought to be selling at the same time:

- 20 gallons of motor oil
- 10 gallons of other petroleum products
- $24 worth of tires and tubes
- $14 worth of automobile accessories
- $6 worth of battery
- 10 lubrication jobs
- $3 worth of miscellaneous labor

You can't sell anything unless you get motorists into your station

Do you know how?

A Dubbscracked gasoline sign will help do it

Dubbscracked gasoline will bring you more gallonage—and your other sales will go up with it

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

well as to the impossibility of its isomerization into an isomer containing such a carbon atom.

Cyclic Hydrocarbons

Naphthenes such as cyclohexane and others are also alkylated by olefins in the presence of metal halides forming substituted naphthenes. The mechanism is similar to that for the alkylation of paraffins. When cyclohexane reacts with ethylene in the presence of aluminum chloride and hydrogen chloride[13] the product is not ethylcyclohexane but its isomerization product 1,3-dimethylcyclohexane. Hydrogen chloride is a necessary promoter for the alkylation; in its absence, only polymerization products were received.

An interesting by-product of the alkylation of cyclohexane with ethylene, namely hexaethylbenzene, may be isolated from the lower catalyst layer. Its presence may indicate the intermediate formation of hexaethylcyclohexane. Intermolecular hydrogenation readily takes place in the presence of aluminum chloride; the hydrogen of the cyclohexane is evidently taken up by the ethylene, since ethane is actually found in the exit gases. It is perhaps more likely that it is the unalkylated cyclohexane and not hexaethylcyclohexane which is dehydrogenated. The formation of hexaethylcyclohexane is unlikely because of the ease with which the ethyl group isomerizes to two methyl groups. The fact that the aromatic compound is found in the lower layer only is due to the formation of addition compounds of aromatics with aluminum halides. Thus, we have prepared a colorless crystalline compound of the formula $C_6(C_2H_5)_6.2AlBr_3$.

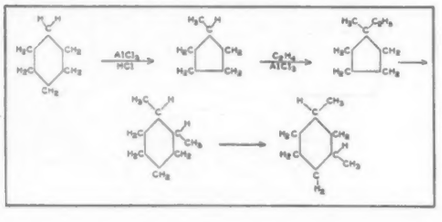
The other naphthenes which have been alkylated with ethylene in the presence of aluminum chloride and hydrogen include methylcyclopentane, methylcyclohexane, and methylisopropylcyclohexane. The reaction proceeds smoothly at room temperature under ordinary pressure.

Although boron fluoride acts as catalyst in the alkylation of methylcyclopentane and methylcyclohexane with ethylene, it does not catalyze the ethylation of cyclohexane. Nor is its action as smooth as that of aluminum chloride; besides the formation of alkyl-naphthenes, some polymerization of ethylene and probably also some splitting of the naphthene ring, leading to paraffins, seem to take place.

The fact that cyclohexane cannot be alkylated in the presence of boron fluoride is important since it throws light upon the mechanism of the alkylation of both naphthenes and paraffins. It will be noted that in all the examples of alkylation involving these two hydrocarbon types, the compounds alkylated either possessed a tertiary carbon atom or were readily isomerized to an isomer possessing such an atom. In the presence of aluminum chloride *n*-butane isomerizes to isobutane; cyclohexane to methylcyclopentane. On the other hand, boron fluoride does not catalyze the isomerization of cyclohexane under the conditions of the alkylations. Hence, no tertiary carbon atom is formed and no alkylation occurs. Methylcyclopentane and methylcyclohexane possess tertiary carbon atoms and are easily alkylated in the presence of boron fluoride. This hypothesis that a tertiary carbon atom is necessary for alkylation receives confirmation in the fact that cyclopentane could not be alkylated with ethylene even in the presence of aluminum chloride.

The reason for the distinctive behavior of the compounds possessing a tertiary carbon atom is, of course, obvious. It is well known that the hydrogen atom attached to a tertiary carbon atom is very labile. And, a labile hydrogen atom is required for the condensation of any hydrocarbon with an olefin, regardless of whether the reaction takes place by way of the mechanism described above or by any other, the net effect of which is the addition of hydrogen and an alkyl group to an olefin.

It seems then, that contrary to what might first be expected, the alkylation of cyclohexane with ethylene in the presence of aluminum chloride does not proceed by means of intermediate formation of ethylcyclohexane which is then isomerized into dimethylcyclohexane, as first shown by Grignard and Stratford and confirmed by us. The reaction involves, perhaps, the preliminary isomerization of the cyclohexane to methylcyclopentane and the alkylation of the latter according to the following, each step of which has been shown to take place with the pure compound:



Benzene and other aromatics possess relatively easily labilized hydrogen atoms. It is, therefore, to be expected that they may readily be alkylated by olefins.

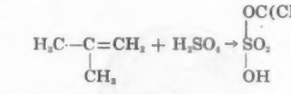
The alkylation takes place in the presence of either metal halides or acids. Since these same substances also catalyze the polymerization of olefins, it is obvious that the alkylation reaction takes place only if it proceeds at a more rapid rate than the polymerization reaction. By proper choice of conditions (temperature pressure and catalyst concentration) the velocity of the desired reaction may be greatly increased at the expense of the side reaction.

The use of aluminum chloride[1] as catalyst for the alkylation of benzene is too well known to require any discussion here. Among the other metal halides which act as catalysts are boron fluoride,[14] zirconium chloride[1] and tantalum chloride.[1] The probable mechanism for the reaction is similar to that for the alkylation of paraffins. The product consists of a mixture of mono- and polyalkylated benzenes, which may easily be separated by fractionation.

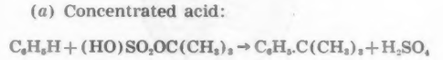
The alkylation in the presence of sulfuric acid at 0°-25° C. gave some interesting and enlightening results.[15] Three competing reactions can take place in a mixture of benzene, sulfuric acid and an olefin: (1) addition of the olefin to the benzene, (2) polymerization of the olefin, (3) addition of the olefin to the acid to form an ester.

The effect of varying the sulfuric acid concentration was investigated, keeping other conditions, such as temperature, pressure, and amount of benzene and olefin, constant. It was found that dilute acid yielded chiefly ester, concentrated acid catalyzed the alkylation, while intermediate concentrations resulted in a mixture of ester and either polymer or alkylbenzene. Thus, the predominating reaction of propene in the presence of benzene and 96 per cent sulfuric acid is alkylation whereas with 80 per cent acid, propene reacts about equally in two directions, ester formation and alkylation. The three-fold competition for olefin is especially noticeable with isobutene. In the presence of 96 per cent acid the main reaction is alkylation, accompanied by a little ester formation. With 80 per cent acid, the chief reaction is polymerization. There is a small amount of ester formation but no alkylation. With 70 per cent acid, the isobutene is converted into ester with neither polymerization nor alkylation occurring.

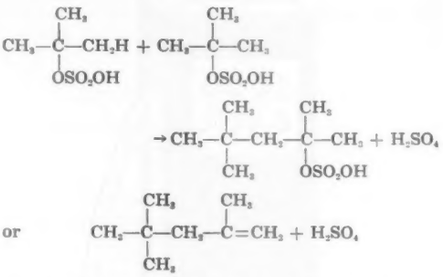
These results indicate that ester formation is an intermediate in the alkylation of benzene with olefins, just as it is in the polymerization of the olefin:



(*a*) Concentrated acid:



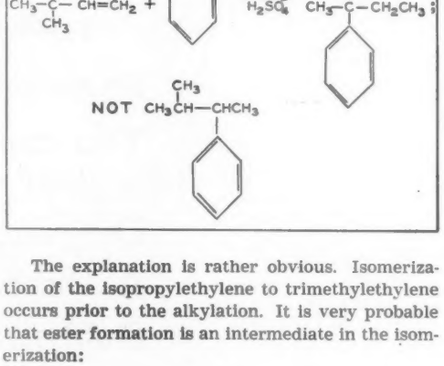
(*b*) Weaker acid:



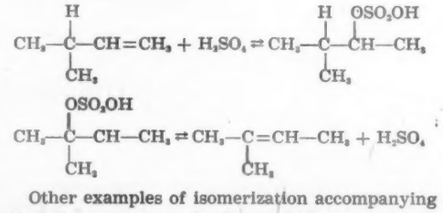
It follows then, that at 0° C. 96 per cent sulfuric acid catalyzes the alkylation of benzene by the alkyl sulfate, more dilute acid catalyzes the formation of polymer from the same ester, and still more dilute acid exerts no catalytic effect, with the result that the ester is obtained as the final product.

We have also found[16] that phosphoric acid can be used as a catalyst for the direct alkylation of aromatic hydrocarbons. The alkylation of benzene, naphthalene, and tetrahydronaphthalene with ethylene at 300° C. yielded the mono-, di- and polyethylated derivatives. Similarly, the propylation of naphthalene and fluorene at 200° C. gave some of the respective monopropylated aromatics. However, the alkylation was accompanied by the polymerization of part of the propylene.

Although the use of sulfuric acid offers a convenient means for the synthesis of alkylbenzenes, it must be used with care, since the product obtained is not always the expected one, but may be an isomeric compound. For example, we found very recently[17] that the alkylation of benzene with isopropylethylene does not yield 2-methyl 3-phenylbutane; instead, *ter*-amylbenzene is obtained.



The explanation is rather obvious. Isomerization of the isopropylethylene to trimethylethylene occurs prior to the alkylation. It is very probable that ester formation is an intermediate in the isomerization:



Other examples of isomerization accompanying alkylation are now under investigation.

Benzene may also be alkylated by naphthenes in the presence of sulfuric acid[18] or aluminum chloride.[19] The alkylation with cyclopropane is

important in that the product is *n*-propylbenzene rather than the isopropylbenzene which is obtained when propylene or propyl halide is used as the alkylating agent. This reaction serves as a very convenient method for the synthesis of *n*-propylbenzene.

The reaction of cyclopentane with benzene,[19] using aluminum chloride as catalyst, yielded cyclopentylbenzene as well as amylbenzenes.

Aromatic hydrocarbons can be alkylated not only by olefins and naphthenes but also by paraffins; aluminum chloride,[20] zirconium chloride[20] and phosphoric acid[21] have been found to act as catalyst. To such alkylations of aromatics by paraffins we have given the name "destructive alkylation," because the paraffin is split into a smaller paraffin and an olefin is statu nascendi, the latter reacting immediately with the aromatic hydrocarbon to yield the alkylated compound. For example, when 2,2,4-trimethylpentane and benzene are stirred with aluminum chloride at 50° C. for three to four hours, isobutane and *ter*-butylbenzene are the principal products:

$$(CH_3)_2C{-}CH_2CH(CH_3)_2 \xrightarrow{AlCl_3} (CH_3)_3CH + [(CH_3)_2CH{=}CH_2]$$

$$[(CH_3)_2CH{=}CH_2] + C_6H_6 \rightarrow (CH_3)_3CC_6H_5$$

Some *p*-di-*ter*-butylbenzene is also formed.

Polymerization of Olefins

There are two types of polymerization catalysts: acids and metal halides. These show some differences but many similarities in their action on olefins. Depending on the conditions, the product may consist exclusively of olefins or it may be a complex mixture of olefins, paraffins, aromatics and saturated and unsaturated cyclic hydrocarbons. It was by recognizing that all these reactions can and must be placed in either one of only two classes that we are able to gain an understanding of the polymerization process and to learn to direct the reaction so as to obtain the desired product. We have given to these classes the names "true" and "conjunct" polymerization. When true polymerization takes place, the product is completely olefinic and consists of dimer, trimer, or higher polymer of the reactant, or a mixture of these. When conjunct polymerization takes place, the product is composed of a mixture of paraffins, naphthenes, cycloolefins and aromatics; it may or may not contain any true polymer of the reactant.

An example will make this differentiation clearer. If propene is bubbled through pure orthophosphoric acid at 51 atmospheres gauge pressure and 204° C. at such a rate that 50 per cent of the olefin reacts, the product consists[2] exclusively of polymers of propene, chiefly nonene and dodecene. If the propene is heated with the orthophosphoric acid in a pressure autoclave at 320° C. and maximum pressure of about 100 atmospheres pressure, the liquid product formed shows[2] the following composition:

Composition—	Per cent
Paraffins	15
Olefins	63
Cycloparaffins	10
Cycloolefins	6
Aromatics	6

In general, the factors which determine whether an olefin will undergo true or conjunct polymerization are temperature, pressure and the nature of the catalyst. True polymerization is favored by lower temperatures and pressures and milder catalyst (for example, more dilute acids).

It is now more than a quarter of a century since I first showed that under high pressures and at temperatures of the order of 350°-400° ethylene polymerizes to yield a mixture of olefins, paraffins, and naphthenes.[2] I showed, too, that catalysts such as alumina, zinc chloride, and aluminum chloride considerably decreased the temperature necessary for the polymerization. At that time I did not attempt to explain the mechanism of the reaction either in the absence or in presence of catalysts, beyond making a few suggestions as to the possibility of converting ethylene into cyclohexane. These suggestions served as the basis for the first hypothesis attempting to explain the course of the polymerization process. And, as you may well imagine, it has been very gratifying to see how well these early ideas have been confirmed by our more recent detailed studies made at Riverside during the past five years.

Some years ago I stated that I believed that the polymerization of ethylene or other olefins into substituted naphthenes was analogous to the polymerization of acetylenes to yield substituted benzenes. I assumed that the higher olefins were formed either by the direct polymerization of the ethylene or by the decomposition of the naphthenes. As evidence for the second assumption, experiments showed that olefins were formed in the decomposition of cyclohexane. The formation of paraffin hydrocarbons during the polymerization was assumed to be due either to the hydrogenation of olefins or naphthenes with scission of the nucleus or to the splitting of side chains from the naphthenes.

On studying the polymerization reaction more thoroughly in connection with catalytic alkylation, I had at my disposal data which permitted me to formulate a general hypothesis explaining these types of reactions and to follow more closely the entire course of the polymerization process. We may now safely conclude that the first step in the polymerization of ethylene is the formation of long chain olefins which may isomerize to cyclohexane and other naphthenes. This isomerization or cyclization is actually an intramolecular alkylation (we shall have more to say about intermolecular alkylation of paraffins with olefins later). Alkylation of the cyclohexane by ethylene yields mono- and polyethylated cyclohexane. The cycloparaffins may also lose hydrogen to form cycloolefins (or in the presence of certain catalysts even aromatics) or cyclic hydrocarbons having a double bond in the side chain. It is the reaction of this hydrogen with the open-chain olefins which yields paraffins. Furthermore, the hydrogenation of naphthenes may also cause rupturing of the ring with the formation of paraffins. Polycyclic naphthenes are probably formed by the alkylation of cycloparaffins with unsaturated cyclic hydrocarbons or by the intermolecular dehydrogenation of cycloparaffins.

It is interesting to note that the true catalytic polymerization of ethylene proceeds in the presence of thorium chloride. Conjunct polymerization in the presence of phosphoric acid yields a number of products, the most unexpected of which is isobutane. Its formation may, however, be readily explained. The first product of the reaction must be *n*-butene. This isomerizes to isobutene which yields isobutane on hydrogenation. The source of hydrogen is the dehydrogenation of naphthenes formed by the cyclization of long chain olefins. That butene-1 actually does yield isobutane under the experimental conditions was shown by heating pure butene-1 with phosphoric acid at 330° in the presence of hydrogen. A liquid polymer and a gas condensable at —78° were obtained. The gas consisted of 50 per cent isobutane, a small quantity of *n*-butane, and the unreacted *n*-butene. The amount of isobutane formed represented 6 per cent of the reacted butene.

Although conjunct polymerization is of much interest and importance both from a theoretical and a practical standpoint, its use in the synthesis of hydrocarbons is limited by its very nature since it yields a complex mixture of compounds. Hence, it shall not be discussed further in this article.

The acids which have been shown to catalyze the true polymerization of olefins include ortho- and pyrophosphoric, phosphorous, sulfuric, hydrochloric, perchloric and chloracetic acids. The most important of the metal halides which act as polymerization catalysts are aluminum chloride, zinc chloride, zirconium chloride, and boron fluoride.

As has been stated, the true polymerization of ethylene has, in the presence of boron fluoride, been accomplished. High temperatures and pressures result in conjunct polymerization. It might be expected that milder conditions will yield true polymers. However, it was found[1] that the only product formed when ethylene is absorbed by phosphoric acid at 200° C. is the monoethyl ester of phosphoric acid. This is stable under the experimental conditions and no polymerization occurs. At much higher temperatures (e.g., 330° C.), decomposition takes place and the products of conjunct polymerization are obtained.

Similar experiments with propene indicated that the isopropyl phosphate which forms is unstable at relatively low temperatures (150° C.) and decomposes with the formation of true polymers. Decomposition of the ester at higher temperature causes conjunct polymerization.

Polymerization of Isobutene

Experiments on the polymerization of isobutene with perchloric acid[8] gave similar and even more striking results. When the reaction product which was obtained at room temperature was heated, it decomposed to yield true polymers. On the other hand, when it was cooled to —25° C. a crystalline substance was obtained.

These experiments made it possible to explain the mechanism of the polymerization reaction with phosphoric as well as other acids. The first step is the addition of the olefin to the acid to yield an ester:

$$CH_3CH{=}CH_2 + HO\overset{\overset{O}{\|}}{P}(CH_3)_2 \rightarrow CH_3{-}\overset{\overset{CH_3}{|}}{\underset{\underset{H}{|}}{C}}{-}O{-}\overset{\overset{O}{\|}}{P}(OH)_2$$

Two molecules of the ester may then react to produce a dimer of the olefin and to regenerate the phosphoric acid

$$(HO)_2{-}\overset{\overset{O}{\|}}{P}{-}O{-}\overset{\overset{H}{|}}{\underset{\underset{CH_3}{|}}{C}}{-}CH_3 + CH_2{-}\overset{\overset{H}{|}}{\underset{\underset{CH_3}{|}}{C}}{-}C{-}\overset{\overset{O}{\|}}{P}(CH_3)_2 \rightarrow$$

$$(OH)_2{-}\overset{\overset{O}{\|}}{P}{-}O{-}\overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}}{-}CH_3 + H_3PO_4 \rightarrow (CH_3)_2C$$

$$= C(CH_3)_2 + 2\,H_3PO_4$$

The resulting polymer may consist of various isomers since the hydrogen atoms split out by the phosphoric acid radicals may be taken from different carbon atoms. The reaction does not, of course, necessarily stop at the dimer stage. The hexyl ester of phosphoric acid may react with the isopropyl phosphate to give nonene. Indeed, the experimental data show that nonene is the chief product and the hexene is obtained in small amount.[1] In this connection it should be stated that pressure plays an important role in determining the products received; the higher the pressure the higher is the yield of hexene and the lower the yield of nonene.

The polymerization of the butenes has been studied in great detail, especially because the isomeric octenes formed under certain conditions may be hydrogenated to yield octanes of high antiknock rating.

When isobutene is polymerized in the presence of phosphoric acid at 30° C., the product[8] consists of only two compounds namely, diisobutene and triisobutene. Indeed, at low temperatures,

THE BEST WELDING is done with TUBE-TURNS

Any welder who has worked with various kinds of pipe fittings will tell you that *the best welding is done with Tube-Turns.* . . . Because of their uniform wall-thickness and true circular cross-section, Tube-Turns can be "lined up" from the outside and still *match the inside diameter of the pipe, all around.* This permits the welder to make a joint of maximum strength, in minimum time, and with minimum waste of rod, gas or current. If you think this is a far-fetched point, hold a stop-watch—then cut some "coupons" and *see for yourself.*

The word "Tube-Turn" is NOT a necessary general trade name for welding fittings. It is the registered trade-mark for the products made by Tube-Turns, Incorporated, under their patents.

TUBE-TURNS
Incorporated
LOUISVILLE, KY.

phosphoric acid is an excellent catalyst for the preparation of diisobutene and this reaction is recommended for obtaining large amounts of the dimer, which is produced in higher yield than when sulfuric acid or zinc chloride are used as catalysts. Hydrogenation of diisobutene under pressure in the presence of nickel oxide readily yields the commercially important 2,2,4-trimethylpentane, commonly called "isooctane."

At higher temperatures,[8] the polymerization product is a mixture of isomeric dimers and trimers, due either to isomerization of the olefin or to the removal of the elements of phosphoric acid from the intermediate esters in different ways. Thus, at 130° C. the product contained about seven individual compounds, consisting of three dimers and four trimers.

The polymerization of *n*-butene is similar to that of isobutene, except that the minimum reaction temperature is slightly higher. At 130° C. in the presence of phosphoric acid a mixture of dimers and trimers was obtained.[6]

A somewhat different type of polymerization is one which we have termed "mixed" or "cross-polymerization." A cross-polymer is obtained when two different olefins react with each other. Examples include the cross polymerization on *n*-butene with isobutene and of propene with *n*- or isobutene. An interesting observation in connection with this type of polymerization was that it makes possible the polymerization of certain olefins under conditions which are too mild to cause the polymerization of the pure olefin. Thus, it was noted that propene in the presence of the butenes begins to polymerize at a lower temperature than it does when alone.[3]

The cross-polymerization of *n*- and isobutene[7] yields 2,2,3-trimethylpentene-3 and 2,2,3-trimethylpentene-4. Other octenes are also formed; their formation may readily be explained by means of the mechanism described above. The cross polymer is obtained at a temperature which is about 50° below that at which pure *n*-butene begins to polymerize. For example, it was found that under comparable conditions in the presence of a "solid phosphoric acid" catalyst, a temperature of 175° C. was required for the polymerization of *n*-butene, while cross-polymerization took place at 120° C. and isobutene polymerized at 90° C.

Other combinations of olefins may, of course, be cross-polymerized. When the product consists of a mixture of isomers, these may be usually separated by careful fractionation. In the case of isomers which have the same configuration and differ only in the position of the double bond, hydrogenation of the mixture yields a single, pure paraffin.

Catalytic polymerization, then, either true or mixed, makes possible the synthesis of olefins and paraffins.

References

1. Ipatieff, V. N., "Catalytic Reactions at High Pressures and Temperatures," New York, The MacMillan Co., 1936.
2. Ipatieff, Ind. Eng. Chem., 27, 1067 (1935).
3. Ipatieff and Pines, Ibid., 28, 684 (1936).
4. Ipatieff and Pines, Ibid., 27, 1364 (1935).
5. Ipatieff and Kurbatov, unpublished results.
6. Ipatieff and Corson, Ind. Eng. Chem., 27, 1069 (1935).
7. Ipatieff and Schaad, Ind. Eng. Chem., 30, 596 (1938).
8. Ipatieff and Grosse, J. Am. Chem. Soc., 57, 1616 (1935).
9. Ipatieff, Grosse, Pines, and Komarewsky, Ibid., 58, 913 (1936).
10. Pines, Grosse, and Ipatieff, unpublished results.
11. Grosse and Ipatieff, unpublished results.
12. Ipatieff and Grosse, Ind. Eng. Chem., 28 461 (1936).
13. Ipatieff, Komarewsky, and Grosse, J. Am. Chem. Soc., 57, 1722 (1935).
14. Ipatieff and Grosse, Ibid., 58, 2339 (1936).
15. Ipatieff, Corson, and Pines, Ibid., 58, 919 (1936).
16. Ipatieff, Pines, and Komarewsky, Ind. Eng. Chem., 28, 222 (1936).
17. Ipatieff, Pines, and Schmerling, J. Am. Chem Soc., 60, Feb. (1938).
18. Ipatieff, Pines, and Corson, Ibid., 60, Mar. (1938).
19. Grosse and Ipatieff, J. Org. Chem., in print.
20. Grosse and Ipatieff, J. Am. Chem. Soc., 57, 2415 (1935).
21. Ipatieff, Komarewsky, and Pines, Ibid., 58, 918 (1936).

REFINERY POWER

(Continued from Page 82)

For installations outside the hazardous areas, motors of the splash-proof type are generally preferred. This construction provides good protection to the motor against rain, drip, and falling objects. For nonhazardous locations exposed to air-borne dust or dust in combination with mist, the totally enclosed fan-cooled motor is preferable.

Turbine Types and Methods of Operation

Considering cost and efficiency jointly, turbines may be considered as divided into two classes, multistage and single stage, each having its field of superiority depending upon the conditions surrounding the application. Multistage construction is best suited to drives where high efficiency is important due to continuous operation or other factors placing a high value upon steam consumption thereby justifying the higher first cost of this type. Single-stage turbines are best applied where the duty is intermittent, as for dual drive, standby, or emergency operation, or on small units, where lower first cost justifies higher steam rate in view of a relatively low yearly total steam consumption.

Turbines are available to suit a wide variety of operating conditions, predetermined for the individual unit, as follows:

1. Super-position, to utilize high-pressure steam from newer boilers and exhaust to low-pressure turbines or steam lines.

2. Noncondensing, where all or almost all exhaust steam can be used at one pressure for processing or heating. Provides an excellent source of power where the demand for exhaust steam exceeds or closely parallels power requirements.

3. Noncondensing extraction, where steam at two pressures is required for processing or heating.

4. Mixed pressure, where there is an excess of low-pressure steam that may be inducted into the later turbine stages.

5. Condensing extraction, where low-pressure steam is required but not in sufficient quantity to utilize the entire steam from the turbine.

6. Condensing, where no demand exists for exhaust steam, a condition infrequent in refineries. This type of operation realizes maximum power from a given boiler capacity.

Balanced Plant Operation Is Objective

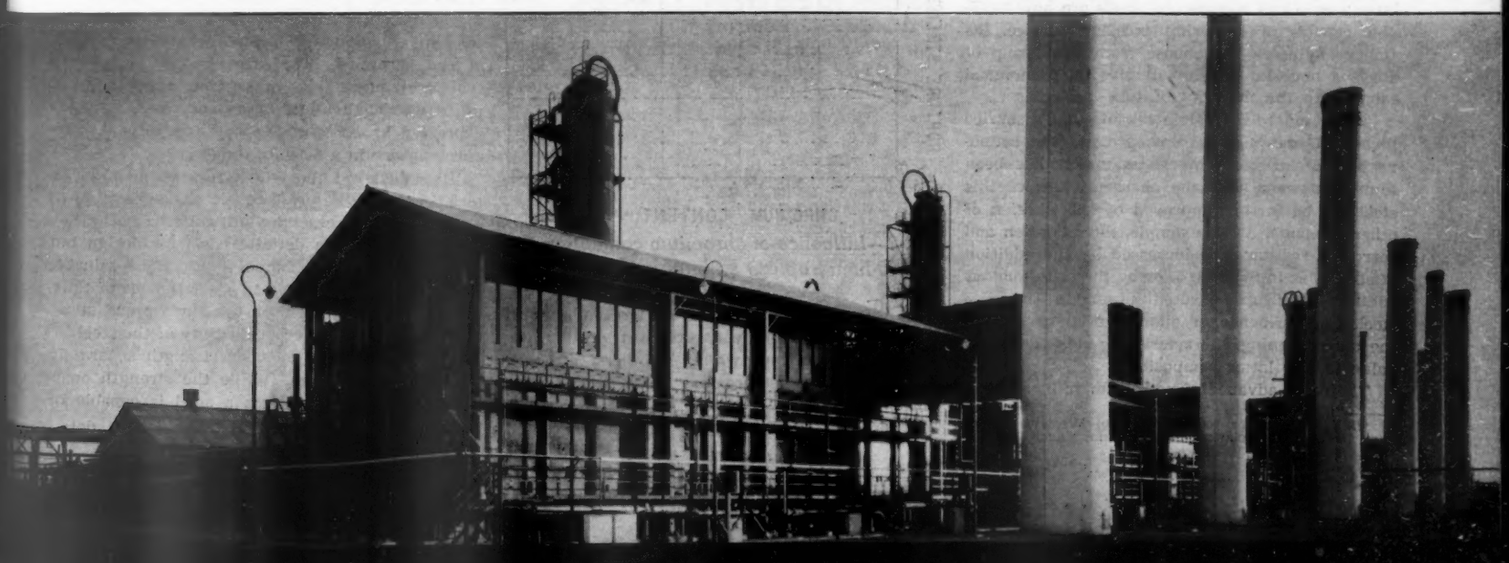
The best overall performance in power supply and utilization is achieved when a proper balance is realized between the various forms of power. While there are some general fundamental guides, a correct and complete decision can be made only after full consideration of all details of the particular problem.

The accompanying diagram shows a simplified example of the power and steam supply problem existing in one refinery. It is not presented as a "typical problem" because there probably is no such thing.

In this case steam is generated at 450 pounds gauge and is normally delivered to two 2,500 kw. turbine generators which exhaust at 200 pounds gauge for process and to operate steam-driven machinery; the latter exhaust into a second pressure supply at 10 pounds gauge furnishing other process and heating requirements. The maximum and minimum flows at the various pressures are indicated on the line diagram. Obviously not all the individual places of equipment are shown but merely enough to indicate the types. The demand for reliability of operation dictates that in many places 100 per cent standby facilities be provided. This particular layout is designed to generate sufficient electric power on the property to supply the needs of the refinery and to maintain balance by shifting from one drive to another as conditions change.

This diagram covers a case of greatest simplicity, however, this type of layout might be adapted to tie-in to an outside source of additional electric power, or the generating units might be driven by extraction or mixed pressure turbines and arranged for automatically adjusting the steam and electric loads to obtained balanced operating conditions with the necessary flexibility.

Clean-oil furnace in foreground is part of Pure Oil Co.'s new 22,000-bbl. combination high-pressure unit at Smiths Bluff refinery



New Developments in Steels for Oil Refinery Service

By MARTIN FLEISHMANN
Timken Roller Bearing Co.*

It is now about 10 years since E. S. Dixon investigated the possibilities of the 4-6 per cent chromium type steels for oil refinery service. Previous to that the choice was limited to two materials, plain carbon steels and highly alloyed stainless steels. Most of the research work done in recent years has been confined to the development of steels between the plain carbon and 4-6 per cent chromium types in order to produce more economical materials. As a result of this a large number of commercial steels are now available capable of rendering excellent service. Refinery engineers can choose from this group of steels a material which will give an economical solution to the majority of tube problems.

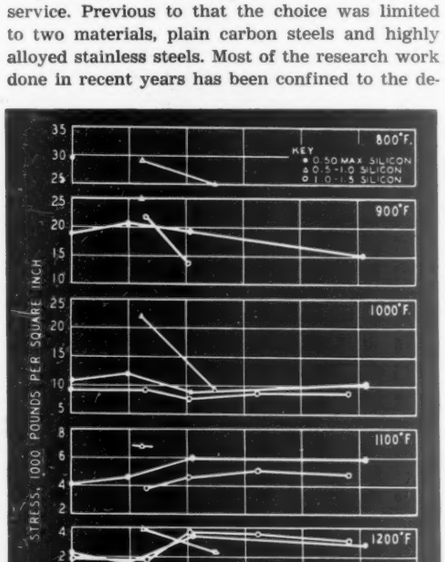


Fig. 1—Influence of varying chromium and silicon content on the creep strength (0.1% for 1,000 hours)

The standard 5 Cr-Mo steel now has a service record of many years, thus proving the soundness of Mr. Dixon's investigations. It has been found, however, that the characteristics of this steel can be further improved by the addition of other elements. As an example, the oxidation and corrosion resistance is increased by the addition of silicon, as in Sicromo 5, or by the simultaneous addition of silicon and aluminum, as in Alcrosil 5 steel. The influence of aluminum in decreasing the air hardening characteristics adds additional value to this latter composition.

The rapid advance of petroleum refinery technology is producing operating conditions under which the 5 Cr-Mo types may not have sufficient strength, oxidation or corrosion resistance, or structural stability to assure the demanded service life. While, under these conditions, the stainless steels may give satisfactory performance, it is believed that the steels containing between 5 and 10 per cent chromium with suitable molybdenum content, will offer the most economical solution. Especially will this be true if advantage is taken of the beneficial effects of silicon or silicon plus aluminum additions.

The Steel and Tube Division of the Timken Roller Bearing Co. in cooperation with the department of engineering research of the University of Michigan has pioneered for over 10 years in the development of alloy steels for oil refinery service. The following six main factors have to be considered in evaluating steels for this application:

1. Strength at elevated temperatures.
2. Corrosion resistance in hot petroleum products.
3. Oxidation resistance.
4. Structural stability.
5. Retention of ductility after prolonged service.
6. Suitable room temperature properties to permit fabrication and installation.

The value placed upon these factors will vary with different installations. For example, with some types of crude, corrosion resistance is the primary prerequisite while in others, strength and oxidation resistance may be of main importance.

There are at present two generally accepted means for evaluating the strength of steels at elevated temperatures; first, the creep test, and second, the stress-rupture test. These two tests differ in the following respects. In the creep tests the stresses are relatively low, resulting in only slight elongation of the specimen during the entire test period. The creep rates are determined from the plotted time-elongation curves and the results are expressed as the stress required for a creep rate of 1 per cent in either 100,000 or 10,000 hours.

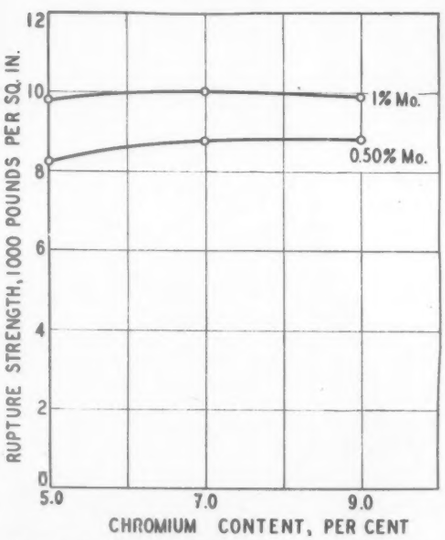


Fig. 3—Influence of chromium content on the 250-hour rupture strength at 1,200° F.

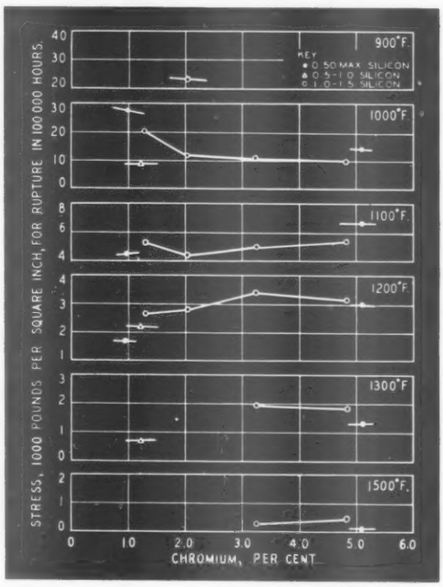


Fig. 2—Influence of varying chromium and silicon content on the rupture strength (100,000 hours)

On the other hand, in the rupture test, higher stresses are used which actually lead to rupture of the specimen. The stresses are so selected that the rupture time varies from a few minutes up to several thousand hours and the results are expressed in terms of the stress required to produce rupture in a definite time period.

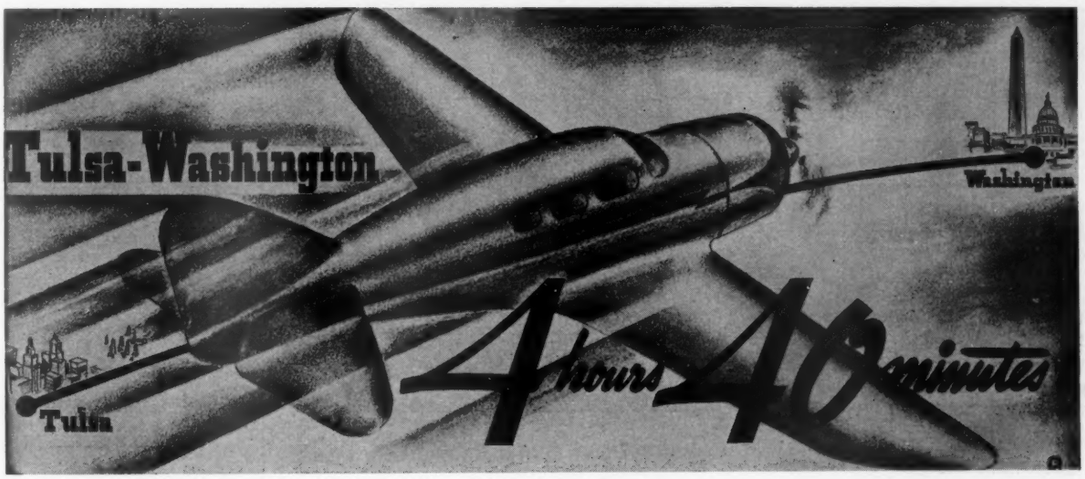
It is believed that the stress-rupture characteristics are to be preferred in the evaluation of steels for use in cracking still tubes because they not only provide a definite basis for design but likewise, as will be shown later, yield valuable information with respect to the influence of time, temperature and stress on the surface and structural stability and the hot ductility of the steel.

It is difficult to consider strength separately from surface stability. While the strength characteristics show the stress a steel is capable of withstanding, its surface stability is the deter-

*Delivered before technical group Western Petroleum Refiners Association, San Antonio, March 20-22.

SPARTAN ALL-METAL Executive

THE WORLD'S MOST MODERN TRANSPORTATION



The Spartan ALL-METAL *Executive* can rightly be called *"The Oil Man's Airplane!"* The *Executives* in daily use by leading Drilling Contractors, Supply and Oil Companies are reducing the days formerly required in travel to minutes and at most a few hours. On a routine business flight, recently, in a SPARTAN *Executive* the 1,050 miles between Tulsa and Washington were flown in 4 hours and 40 minutes.

As a business man you cannot afford to ignore the tremendous savings in time air travel and more particularly the SPARTAN *Executive*, have made possible . . . a typical afternoon, a long distance call and the necessity of your being in a distant city, perhaps half way across the continent as soon as possible . . . with the SPARTAN *Executive* that same afternoon will see you in that city, your work completed and if necessary before noon the next day you will be back at your desk . . . such is the world of tomorrow made possible today when you travel the modern way—in a SPARTAN *Executive*.

The *Executive* will add days to your business week and you will know a new meaning to travel in luxurious comfort. The SPARTAN *Executive* is THE airplane with which no other can compare—we welcome the opportunity of proving this statement IN THE AIR.

CONSTRUCTION—of ALL-METAL on a bridge-like frame, giving strength unknown to old type wood and fabric construction.

BEAUTY—unexcelled in streamlined exterior, luxury and comfort of cabin interior. The ideal airplane for Ambulance and Aerial Photography, available with special cabin arrangements.

PERFORMANCE—of rapid climb, short landing distance, with safety features pioneered by SPARTAN.

SPEED—cruising speed in excess of 215 m.p.h. cuts travel days to minutes, with distant points easily accessible in a few hours.

ECONOMY—of operation.

When in Tulsa we invite you to inspect the Spartan Factory, School of Aeronautics and Government Approved Repair Station No. 50—the most Complete Aviation Facilities in the Southwest.

M. S. Kelly

PRESIDENT
SPARTAN AIRCRAFT COMPANY
AND SPARTAN SCHOOL OF AERONAUTICS

THE WORLD-OVER BUSINESS LEADERS SUCH AS THESE IN THE PETROLEUM INDUSTRY FLY THE SPARTAN ALL-METAL Executive:

AMERICAN MANUFACTURING COMPANY

OLSON DRILLING COMPANY

HALLIBURTON OIL WELL CEMENTING COMPANY

LEE DRILLING COMPANY

LUCEY PRODUCTS CORPORATION

BODINE DRILLING COMPANY

SEISMOGRAPH SERVICE CORPORATION

CLAUDE DRILLING COMPANY

STANDARD OIL COMPANY OF OHIO

SKELLY OIL COMPANY

And because of their great speed Spartan Executives are in military use by the governments of Mexico and China as well as by private Industries in South America and Europe. .

SPARTAN AIRCRAFT COMPANY

BUILDERS OF THE BUSINESS MAN'S AIRPLANE, THE SPARTAN EXECUTIVE, MILITARY CONVERSION 7 W-F and ALL-METAL MILITARY ZEUS

TULSA, OKLAHOMA

TOMORROW'S AIR TRANSPORTATION TODAY

mining factor in its ability to carry this stress for prolonged time periods. Because of this it is possible for a steel with lower strength to actually have a greater load-carrying ability than a steel with a higher strength.

Varying chromium content.—The effect of variations in the chromium content, up to 5 per cent, on the creep and rupture strength is shown in Figures 1 and 2. These graphs likewise show

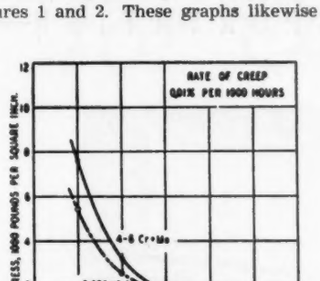


Figure 4

Effect of 1.50 per cent Si. on the creep strength of 4-6 per cent Cr-Mo steel. Note that above 1,300° F. the Sicromo 5 steel, due to its greatly improved resistance to scaling, shows greater creep strength than the 4-6 per cent Cr-Mo steel

the influence of variations in the silicon content over the range from 0.5 max. to 1.5 per cent.

In general, variations in chromium content over this range have little effect on either the creep or rupture strength although at the lower temperatures the maximum is obtained with steels of about 1 per cent chromium. This, however, does not imply that the actual load-carrying

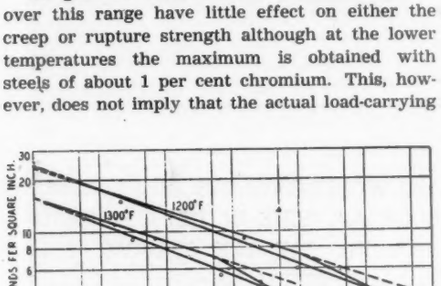


Figure 5

Effect of 1.50 per cent Si on the stress-rupture strength of 4-6 per cent Cr-Mo steel. Note that the Sicromo 5 steel, containing 1.50 per cent Si. due to its greatly improved oxidation resistance, maintains a straight line, whereas surface and intergranular oxidation weaken the low silicon 4-6 per cent Cr-Mo steel, causing a break in the line

ability is independent of the chromium content for, under corrosion or oxidizing conditions, the higher chromium steels would have the greater load-carrying ability due to their greater surface stability.

Complete information is not as yet available with respect to the creep and rupture strength of the steels containing more than 5 and up to 10 per cent chromium. As shown in Figure 3, it would appear that, on the basis of 250-hour rupture tests at 1,200° F., variations in the chromium content over this range have no influence on the rupture strength. Again, it must be realized that these tests were conducted under slightly oxidizing conditions. However, under more oxidizing or corrosive service, increased chromium content would have showed to advantage.

Varying silicon content.—The influence of silicon additions, in amounts up to 1.5 per cent, on the creep and rupture strength was shown in Figures 1 and 2. The effect of this same element on the creep strength of a steel of the 5 Cr-Mo type is shown in Figure 4. It will be seen that at 1,000° and 1,100° F., increased silicon content lowers the creep strength, but is without appreciable influence at 1,200° and 1,300° F.

In the case of the rupture strength, however, Figure 5, increased silicon content is decidedly beneficial mainly because of its influence on the surface and structural stability. Here is a case

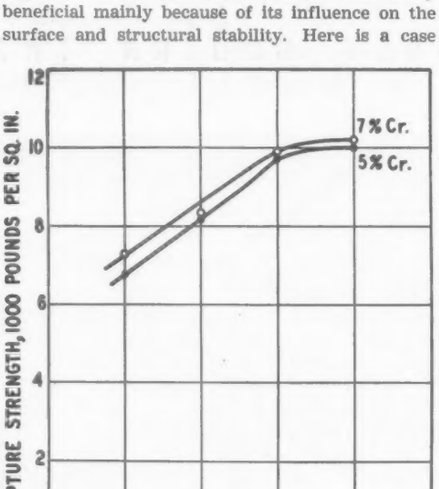


Fig. 6—Influence of molybdenum content on the 1,000-hour rupture strength at 1,200° F.

where the steel with the lower creep strength actually possesses the greater load-carrying ability. Preliminary results indicate silicon to exert the same general influence on the higher chromium steels.

Varying molybdenum content.—Molybdenum is present in most of the high-temperature steels because of its effectiveness in improving the strength and in eliminating susceptibility to temper embrittlement. The amount of this element in most steels to date has been limited to about 0.5 per cent.

The extent to which the strength of two types of steel can be increased by further additions of molybdenum, up to 2 per cent, is shown in Figure 6. Nearly a straight-line relationship exists between the strength and molybdenum content, up to 1.5 per cent. The further addition of molybdenum is not nearly as effective in improving the strength.

The values given apply only at 1,200° F. and are based on stress-rupture tests of 1,000 hours duration. Further work is in progress in order to determine the influence of increased molybdenum content at other temperatures and on other steels.

Among the materials now under test in this development program is a 5 per cent chromium-2 per cent silicon-3 per cent molybdenum steel, designated as 5-2-3. As shown in Figure 7 the rupture strength of this material at 1,500° F. surpasses that of the stainless 18-8 composition un-

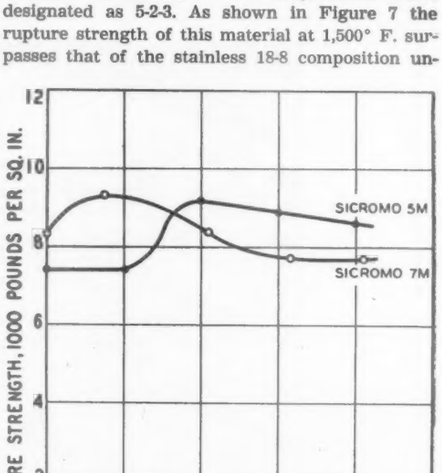


Fig. 8—Influence of vanadium content on the 1,000-hour rupture strength at 1,200° F.

der prolonged time periods. This steel likewise has an oxidation resistance equal to 18-8 at 1,500° F.

Varying vanadium content.—The use of vanadium in high temperature steels has been restricted because of economical considerations. As will be shown later, this element does have a beneficial influence, in combination with chromium, in imparting resistance against hydrogen penetration under high temperature and pressure conditions.

The effect of vanadium on the rupture strength

(Continued on Page 129)

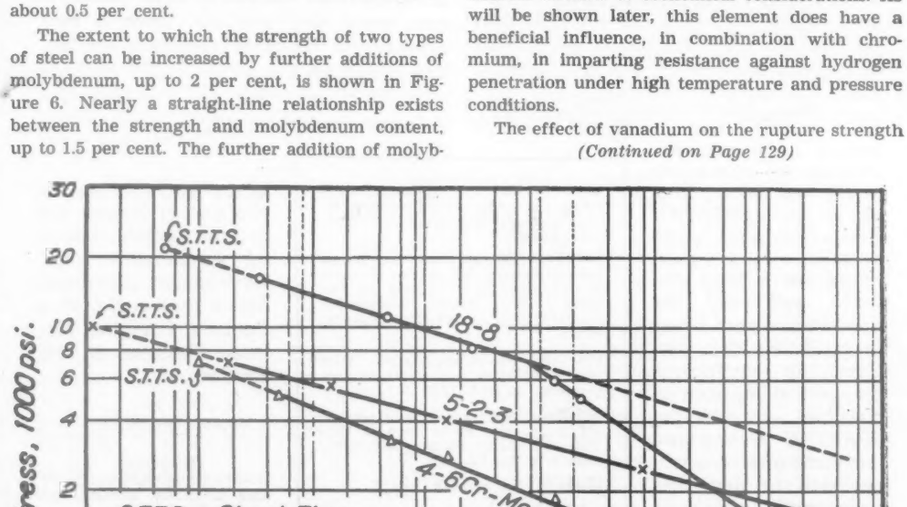
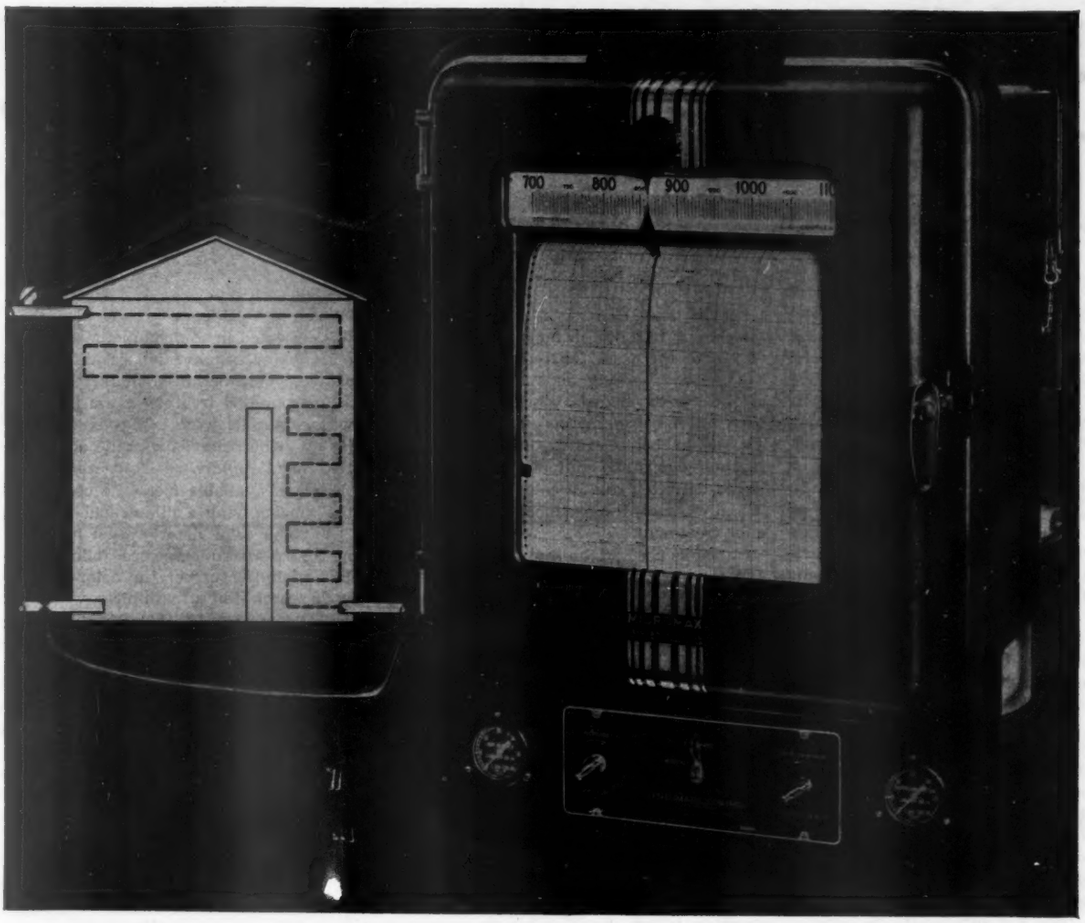


Fig. 7—Stress-rupture relationship for designated steels at 1,500° F.



IF *More* THROUGHPUT IS THE PROBLEM

Increasing the outlet temperature of cracking units is a plan which refineries are finding particularly effective as a means of increasing throughput when they apply the new Micromax Pneumatic Controller to the temperatures.

The Controller not only reduces fluctuations, but the same instrument also records, so the operator can seize every opportunity to move the temperature setting up. He usually leaves a safety factor, but he knows that he adds very substantially to the throughput for every degree of temperature increase.

See Catalog N-00B, "Micromax Pneumatic Control"

LEEDS & NORTHRUP COMPANY, 4959 STENTON AVE., PHILA., PA.

LEEDS & NORTHRUP

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

Jrl Ad N33A-702(9)

Treat Cracked Distillates With Caustic Methanol Solution

By P. L. BRANDT and J. O. HOUGEN
Assistant Director of Research — Research Chemist
Pan American Refining Corp.

The properties characterizing distillate fuels may be divided into two classes. First are those properties which directly influence the burner performance of the fuels such as volatility, chemical composition, and tendency towards sediment formation. Second come properties which are of interest primarily because of the reaction they produce in the mind of the consumer. To this class belong such properties as odor and color. Color stability probably belongs to the second class although there is some evidence that an oil of high color stability is resistant to those types of aging resulting in unsatisfactory performance of burner installations. Regardless of whether this latter point is admitted the fact remains that the salability of an oil is directly related to its color. Suitable color of an oil at the time it reaches the ultimate consumer can be assured only by refining the oil at a high degree of color stability at the refinery.

Production of oil with a high degree of color stability is a more serious problem in the case of cracked oils than in the case of virgin oils. Most cracked oils which have been distilled properly will be found to have good initial colors. However, upon exposure to air, these oils will suffer rapid color degradation. Such oils may be entirely suitable initially and yet deteriorate to unsatisfactory color levels in as short a time as a few hours. Perhaps the most commonly used method of refining such oils is by treatment with concentrated sulfuric acid followed by redistillation of the treated oil. The disadvantages of this treatment are well known—polymerization and solution losses, production of difficulty disposable acid sludge, costs of redistillation and of redistillation equipment, need for intermediate storage tanks, etc. In a search for a method which would eliminate the need for redistillation of such oil the method serving as subject matter for this article was developed. While this method has not been put into commercial use because it did not appear to be advantageous enough to justify scrapping existing equipment, it has been established definitely that a color stable oil of suitable initial color can be produced by the caustic methanol treatment.

The oils used as the raw stocks for the treating experiments described below were cracked stocks from a variety of crudes ranging from Mid-Continent to coastal types. In plant practice oil so produced is given the conventional acid treatment followed by redistillation and then is blended with color stable virgin stocks to meet gravity and distillation specifications. The gravities of the oils studied varied from 28° to 33° A.P.I., the initial boiling points were approximately 350° F., and the final boiling points ranged from 630° F. to 690° F. In general all oils produced had initial colors immediately after removal from the cracking unit of 17 to 18 Tag. Robinson.

Preliminary Laboratory Experiments

In preliminary work on this problem various reagents which would serve to remove specific types of compounds without attacking the principal hydrocarbons composing the oil were tried. The effect of dilute sulfuric acid in well known in removing certain compounds which have a deleterious effect on color stability of oils.[1] Actually some stabilization of the color of the cracked oils under investigation was effected by washing with aqueous sulfuric acid of 25 per cent concentration. However, the stability of the oil effected in this manner was of short duration and the subsequent deterioration of the oil was rapid. Beyond the initial stabilization of the oil resulting from this treatment, the fact that color unstable materials were being removed was demonstrated by the behaviour of the acid extract which darkened rapidly on exposure to air. Further proof was available from the color improvement noted in applying a dilute acid wash to raw oils after some color deterioration had occurred.

Two routes were followed in attempting to stabilize further the color of the oil. One was a search for an inhibitor which would retard deterioration of the acid treated stock. No compounds were found giving the required degree of stabilization. The second was a search for an auxiliary treatment which would stabilize the oil and at the same time avoid production of polymers or other undesirable compounds necessitating redistillation. It was thought that perhaps the color forming compounds remaining in the oil after dilute acid treatment were acidic in character. Treatment of the oil with aqueous caustic however did not prove satisfactory. Since it is known that alcoholic solutions of caustic are more effective than aqueous caustic in removing weakly acidic substances from oils, and in improving color stability,[2] attempts at treating with caustic dissolved in methanol were initiated. In all cases it was found that treatment with this reagent in a separatory funnel resulted in a considerable loss in initial color although it appeared that the resulting product was of much improved color stability.

It was observed that the caustic methanol extract darkened rapidly in contact with air, quickly becoming black and opaque. This observation led

TABLE 1—COLOR STABILITY OF FURNACE OIL
(Colors—Tag. Robinson)

Experiment or run:	Exp. 59	Run 4	Run 9	Run 10	Run 11	Run 12	Exp. 66*
Per cent caustic-methanol	None (raw oil)	8.6	8.1	6.0	10.0	8.0	None
Per cent H_2SO_4 (25 per cent acid)	0	1.0	1.0	1.0	1.0	1.0	None
Color Stability—Accelerated Test							
Hours at 212° F.:							
0	11¼	17¼	17¼	17¾	17¾	17½	18¾
4	11¼	17	17	17¼	17¾	..	17½
8	10½	14	15¼	..	17¾	17¼	17½
12	9¾	..	..	..	12¾	14¾	17
16	9¾	13	12¼	12¼	14½	17	17
24	6½	11	10¼	11	11¼	11½	15¼

Bottle Storage—Days at 100° F.

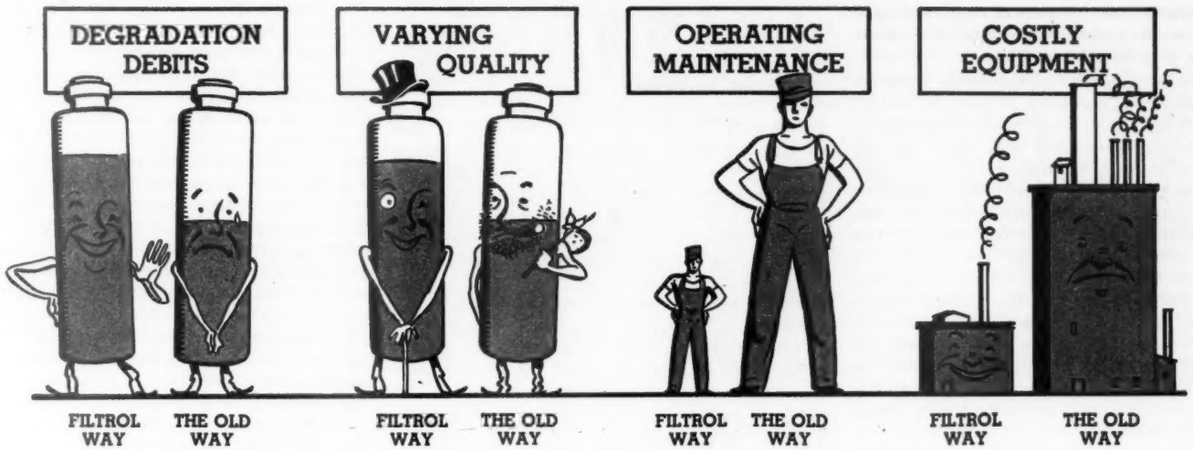
Days	Color	Days	Color	Days	Color	Days	Color	Days	Color	Days	Color	Days	Color
0	11¼	0	17¼	0	17¼	0	17¾	...	.....	0	17½	0	18¾
14	10¼	62	14	34	17¼	34	16¾	...	.....	39	16¾	41	17
25	3½	101	13¼	72	17	72	10	...	.....	74	13½	110	15
31	2½	136	13	107	17¼	107	16½	...	.....	171	14	224	14¼
61	2½	233	11½	204	15¼	204	14¼	...	.....	266	14¼	323	15
82	2	328	11	299	15	299	17	...	.....	...	..	358	13¾
125	1¾												
151	2												

Barrel Storage—Days at Atmospheric Conditions (Average Temperature Approx. 70° F.)

Days	Color	Days	Color	Days	Color	Days	Color	Days	Color	Days	Color	Days	Color	Days	Color
...	.....	0	17¼	0	17¼	0	17¾	0	17¾	0	17½	...	.....	...	.....
...	.....	44	17	36	17¼	35	17½	33	17½	5	17½	...	.....	...	.....
...	.....	146	14	74	17	73	17	71	17¼	44	17	...	.....	...	.....
...	.....	181	13¾	109	16¾	108	16	106	17	79	16¾	...	.....	...	.....
...	.....	217	12¾	206	17	205	16¼	203	17¼	176	15½	...	.....	...	.....
...	.....	373	11½	301	16	300	15½	298	15¼	271	14¼	...	.....	...	.....

*Treated with 2½ pounds 89 per cent H_2SO_4 per barrel and redistilled.

How this Proven Process Overcomes Four Obstacles to Profitable Refining



FILTROL FRACTIONATION IS RECOMMENDED

Successfully operating installations have conclusively convinced plant operators that the Filtrol Fractionation Process actually and definitely:

PRODUCES greater oil recovery—less waste.

PRODUCES higher quality lube—more profits.

REQUIRES LESS equipment —saving 25% to 40%.

REDUCES maintenance and operating costs—less labor.

Add to this the saving effected by eliminating separate contact heater; reduction of filtering load; increased productivity due to oil going through the system faster; and you have still MORE proof of Filtrol efficiency and money-saving qualities.

for

1
SOLVENT TREATED STOCKS

2
LONG RESIDUALS

3
LOW ASPHALTIC OR TREATED LUBE CRUDES

4
DEWAXED BRIGHT STOCK

License to use the Filtrol Fractionation Process is automatically extended with SUPER FILTROL... the activated bleaching medium that produces such remarkable results. And our research laboratory will gladly show you how to adapt it to YOUR plant.

We have secured permission to reprint an interesting article on a recent Filtrol Fractionation installation which appeared in this and other industry publications recently. It tells the complete story of an interesting case history... send for a copy!

FILTROL 10P

FILTERING MATERIAL FOR DECOLORIZING & PURIFYING

FILTROL CORPORATION

GENERAL OFFICES: 315 W. FIFTH ST., LOS ANGELES, CALIFORNIA
PLANTS: VERNON, CALIFORNIA; JACKSON, MISSISSIPPI

to the belief that the color degradation during the treatment with caustic methanol was a result of oxidation during the treatment. This belief was supported by the observation that colored material was readily taken up by furnace oil upon contacting with aged caustic methanol extract.

The above experiments led to a treatment with dilute sulfuric acid followed by a treatment with caustic methanol in the absence of air. Under these conditions it was found that essentially no color degradation was incurred during the caustic methanol treatment and further that the resulting oil was of good color stability.

In order to expedite experimental work on this problem it was necessary to have an accelerated method for establishing the color stability of the treated oils. Previously data had been obtained in an attempt to correlate actual storage behavior of distillate fuels with an accelerated aging test patterned after the Atlantic Refining test on cracking gasoline.[3] In this modified test procedure 200 cc. portions of the sample are placed in 250 cc. Pyrex bottles fitted with slotted corks and heated at 212° F. for various lengths of time. At four-hour intervals during the heating period individual samples are removed from the steam bath and cooled rapidly. Colors are then taken directly, assuming no evaporation loss. Preliminary correlations of this method with actual storage tests were not entirely satisfactory but they indicated that one hour under test conditions was equivalent to at least five days in tank storage. Later data on oil treated with caustic methanol indicated, as shown in Table 1, that for oil so treated the relation of actual storage stability to accelerated test is much greater than this conservative value. It will be noted also that correlation of accelerated test and actual storage leaves much to be desired, especially when oils which have received different types of treatment are considered. This point is emphasized by the very rapid deterioration of untreated samples in storage as compared with the indications of the accelerated test. Barrel storage data on the untreated sample included in this table were not obtained, but observation of the behavior of untreated oil in tank storage confirms the bottle storage results.

In Table 1 data are presented on oil which had been acid treated and rerun. This oil appears definitely superior on the basis of accelerated test results, while it is of essentially the same color stability as several of the caustic methanol treated oils on the basis of actual storage tests. However, in the absence of a better rapid method, the method described served to give semi-quantitative information on the various treatments employed.

Batch Treating Experiments

The first part of the experimental work was conducted batchwise in separatory funnels. In order to avoid contact with air during the caustic methanol treatment the funnel was carefully swept with methane and thereafter the equipment was maintained under a slight gas pressure to avoid introduction of air. Addition of chemicals was made through separatory funnels inserted through a cork in the treating funnel. Separation of reagent caustic methanol was accomplished by settling followed by filtration through cotton in an atmosphere of gas. After complete separation of the caustic methanol other operations were carried out in the presence of air. A preliminary dilute acid wash was given by drawing fresh oil from the cracking unit directly into a bottle containing the acid. The mixture was immediately agitated before color degradation could occur. In certain cases this step was also carried out in the absence of air to avoid carrying dissolved oxygen into the caustic treating equipment. For investigation of the combined acid-caustic treatment it was necessary arbitrarily to set one of the variables. It was decided to treat regularly with 1 per cent by volume of 25 per cent sulfuric acid irrespective of the caustic methanol treatment given. It was felt that this amount of dilute acid would be entirely practical in plant operation and it proved to be adequate in conjunction with the caustic methanol treat to effect the necessary degree of stabilization. It was also necessary to set either concentration or quantity of caustic methanol used. Since the solubility of caustic in methanol is limited and the specific gravity differential between oil and reagent must be kept at a maximum in order to afford the greatest ease in gravity separation, a concentration of 130 grams of sodium hydroxide per liter of solution was established as the standard treating solution.

TABLE 2—EFFECT OF VARIOUS QUANTITIES OF CAUSTIC METHANOL ON THE COLOR STABILITY OF FURNACE OIL

Results of Accelerated Test at 212° F.

	Experiment number					
	8*	6	5	4	3	3A
Per cent 25% H_2SO_4	0	1	1	1	1	1
Per cent caustic menthanol	0	1	2	4	6	8
Hours at 212° F.	Tag. Robinson colors					
0	17½	17	17¼	17¼	17½	17½
4	13¼		17	15	17¼	16¾
8	12¾	10¾	17¼	14	17	14
12	9¾	10¾	12¾	13	15	14½
16		10¾	13¼	12¼	14½	13
24	10¾	10¼	11¼	10½	12½	14

*Raw oil, no treatment.

Among the first points to be investigated was the effect of varying amounts of caustic methanol on the color stability of the treated oil. Data on these experiments are shown in Table 2. It will be noted that color stability, as determined by the accelerated test, increases with increasing amount of caustic methanol. In accordance with the criteria given above it appeared that 6 per cent to 8 per cent by volume of reagent was necessary to effect the desired improvement in color stability. The superiority of the 8 per cent treatment is particularly evident from the color after 24 hours at 212° F. Attention is called to the comparatively good color stability shown by the sample receiving no treatment. An indicated above and as shown in Table 1 such untreated oils show actual storage stabilities far poorer than indicated by the accelerated test. Actually, as seen from the accelerated test in Table 1 where several days were allowed to elapse before running color stability, the oil deteriorated to a very low initial color. The accelerated test data must therefore be interpreted as showing much more improvement on treating than is indicated by a superficial perusal of the data.

When it was found that amounts of caustic methanol of the order of those given above would be required for treatment of the oil it appeared that further investigation of the process would not be commercially feasible unless recovery of alcohol and unused caustic were possible. Recovery of methanol from the separated reagent is simply a matter of fractional distillation. It was found that if water was added to the aged caustic methanol extract and the methanol removed by distillation, hydrolysis of the colored materials was readily accomplished. These compounds, in admixture with some oil dissolved by the reagent, separated from the residue of aqueous caustic readily. The resulting aqueous caustic solution can therefore be used again if it is of such concentration as to avoid introduction of harmful amounts of water into the caustic methanol treating solution prepared therefrom. A series of treating experiments was therefore conducted in which the caustic methanol contained enough water to give aqueous solutions, after removal of methanol, ranging down to 60 per cent caustic. The results of these experiments are shown in Table 3. It will be noted that no unfavorable effect of the water in this range was noted. It is probable that even more water can be tolerated. It is thus apparent that by using aqueous caustic methanol in the amounts indicated it is possible to recover the methanol practically completely by distillation and then to separate the oily and colored materials from the aqueous caustic, after which the aqueous caustic may be remixed with the methanol for the start of a new extraction. The methanol dissolved in the furnace oil can be extracted readily from the oil by the use of a small amount of water, followed by recovery of this methanol by fractional distillation.

Continuous Treating Experiments

Obviously it would be desirable to carry out such an extraction process on a continuous basis. Hence it was felt that further experimenting should be done on continuous equipment. Furthermore, certain anomalous results were obtained in the batch treatments which were believed to be related to possible air admission to the batch treating equipment. Before designing a pilot plant various experiments were conducted on removal of reagents and water from the oil by settling alone. As stated above most batch treats involved filtration through cotton for rapid removal of reagents. However, it was demonstrated that removal by settling was sufficiently complete between different steps in the process to preclude the necessity of other means of separation. Further experiments were carried out in a continuous

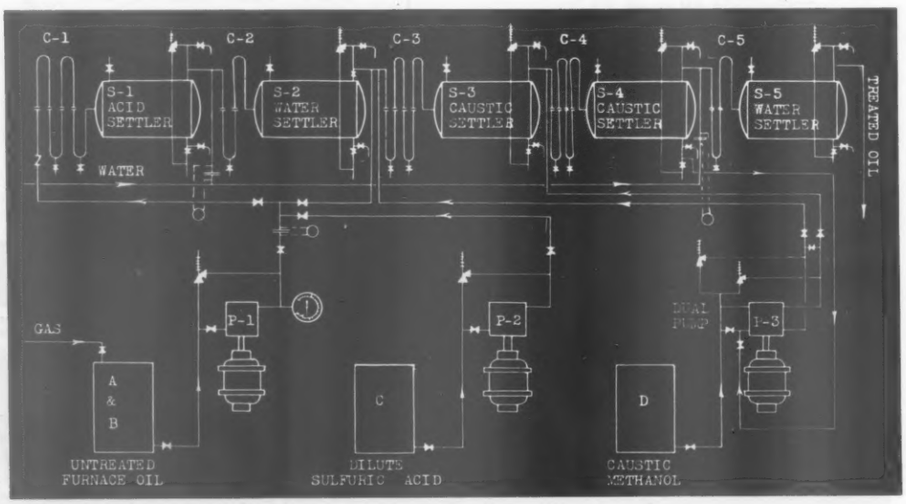


Fig. 1—Flow diagram of caustic methanol treating system

plant capable of handling 50 gallons of oil per hour. A flow diagram of this plant is shown in Figure 1. It will be seen that this plant provides for a dilute acid wash followed by a water wash, next a two-stage caustic methanol wash, and finally a water wash.

In operation of the pilot plant several difficulties were encountered. In early runs color stability of the product fell considerably below the values obtained in batch treatment. One of the causes for this difficulty was undoubtedly inadequate mixing in the contact coils originally supplied. This difficulty was solved at least partially by the installation of smaller mixing orifices with accompanying higher pressure drops through these orifices. A distinct improvement was noted as a result of this change. A second and more serious difficulty encountered was carry-over of emulsified water from the final water wash. It is believed that this difficulty was accentuated by the presence of caustic in the furnace oil leaving the final caustic methanol settler. This difficulty has not been satisfactorily overcome although it was found that separation could be obtained by settling at temperatures of about 150° F. or slightly less. This expedient was employed during the course of the pilot work although it now appears probable that a suitable filter would be much more economical and practical.

As the pilot plant work progressed samples from each run were placed both in bottle storage at 100° F. and in barrel storage at atmospheric temperature. Results of typical storage tests are shown in Table 1. Data are also given on the accelerated color stability of the oils produced. It will be noted that in most cases the oils so produced had very satisfactory color stability. As stated above comparative data are included on oil which had been acid treated and rerun in the conventional manner. Actual storage tests shown indicate the conventionally treated oil in this case to be superior in certain cases and slightly inferior in other cases when compared with the caustic methanol treated oils. It is evident of course that with any type of treatment the stability conferred with vary within limits with the amount of reagent used. The results of conventional treating are simply included to orient the stability results on caustic methanol treated oil with respect to those by a better known process.

Up to the point where plant experiments were conducted the process seemed to work with entire satisfaction on oils produced from various types of crudes and from cracking units operating under somewhat different conditions. In the pilot plant experiments difficulty was encountered with oils from certain coastal crudes, although identical oil treated batchwise was of suitable color stability. Further experimentation on this method of treatment was discontinued before an entirely satisfactory explanation of the difficulties encountered in pilot plant operation was discovered. Several factors might account for the difficulty as discussed in the following section.

Discussion of Results

As far as is known the conditions necessary for the preliminary treatment with sulfuric acid are not critical. This treatment may be applied either in the presence or absence of air. The water wash to remove suspended acid involves no difficulties in itself. However, when the caustic methanol extraction is considered several difficulties appear. Most critical of these seems to be the need for absolute exclusion of oxygen. Even in batch experiments certain anomalous results were obtained on identical oils treated with identical amounts and character of reagents. The only apparent explanation was that oxygen not only causes loss of initial color during the treatment with caustic methanol but may also cause loss of color stability. This would serve as a partial explanation also of the poor color stability observed

TABLE 3—EFFECT OF THE PRESENCE OF WATER IN REAGENT ON THE COLOR STABILITY OF CAUSTIC METHANOL TREATED FURNACE OIL*

Results of Accelerated Test at 212° F.
(Colors—Tag. Robinson)

	Experiment number				
	29	33	28	31	32
Per cent water based on methanol free caustic	0	0	20	30	40
Hours at 212° F.					
0	17	17¼	17	17	17
4	13½	14¼	14½	14	14½
8	12¾	14	13½	13½	14
12	12	13	13¼	12¾	13¾
16	12¼	12¾	13	13½	12¾
24	11¼	12¼	12¼	12¼	12

*All treats 1% by volume, 25% sulfuric acid and 8% by volume caustic methanol reagent.

on certain pilot plant treats as compared with the efficacy of laboratory batch treatment of similar oils. In the water wash following the acid extraction a small amount of oxygen was introduced in the wash water and this may serve as one point of oxygen introduction. Perhaps better results would have been obtained by eliminating oxygen from the wash water. It is possible that more efficient settling of the acid-oil mixture would eliminate the necessity for this water wash and that by this means introduction of air at this point could be minimized. Another major difficulty was the production of a relatively stable water emulsion in the final water wash discussed above.

Time has not been available to determine the natures of the color forming bodies removed by the two steps of the treatment. The acid wash undoubtedly removes nitrogenous bases. From other work which has been done along this line it seems that these may be cyclic bases probably related to pyridine and quinoline. The nature of the material extracted by the caustic methanol is even more doubtful. The solvent effect of the methanol itself probably results in removal of certain undesirable constituents. To what extent this contributes to the improved color stability is not known although experiments at high and low caustic concentration indicate more benefit at the high caustic concentration and hence any effect of the methanol alone appears to be only part of the effect of the caustic methanol. Certain it is that the substances are not strongly acidic since color stabilization is not effected to a marked degree by aqueous caustic. From the practical standpoint the ease of oxidation in caustic solution of the extract material is particularly important. This is of course the factor which makes essential the absence of oxygen during the treatment. Obviously any amount of oxygen which causes a loss in initial color is undesirable, and, as pointed out above, during the experimental work it appeared further that small amounts of oxidation which were insufficient to effect a noticeable change in initial color might still be detrimental to color stability. From the above discussion it will be seen that in plant application the equipment for carrying out this process should operate in direct conjunction with the cracking unit from which the oil is being eliminated in order to avoid both color deterioration in storage and also solution of oxygen in the oil before treatment.

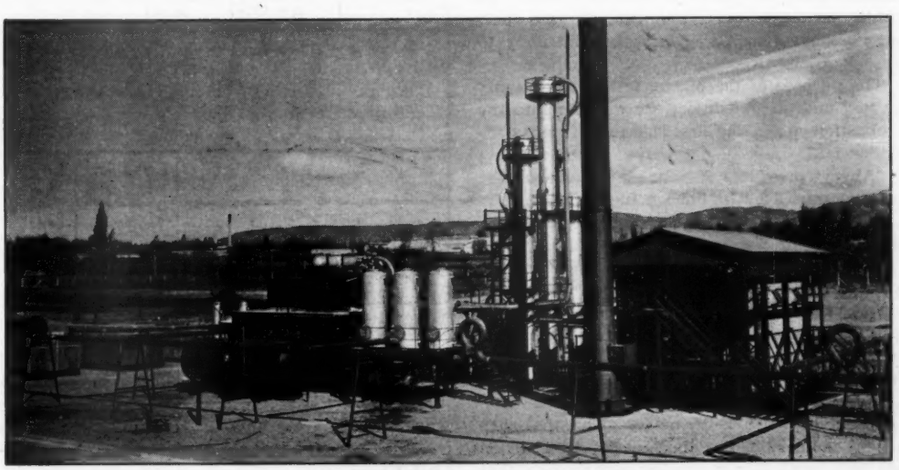
Economics of the process of course will depend largely on economical and efficient recovery of reagents. This is particularly true of the methanol employed because of the relatively high cost of this reagent. In practice at least 90 per cent of the methanol was separated in the spent reagent. This methanol is recoverable by distillation. The remainder can be substantially completely removed in the final water wash and the methanol is recoverable therefrom by fractional distillation. On the basis of data at hand and by analogy with other processes involving the use of volatile solvents, a recovery of methanol approaching 99.8 per cent should be possible with carefully designed equipment. Slight acid carry-over from the acid treating stage will result in loss of a small amount of caustic. It is probable that the small amount of caustic which remains suspended in the oil leaving the caustic settlers could not be recovered economically from the wash water. In pilot plant work caustic losses from these two sources were of the order of 0.25 pound per barrel of oil. Recovery of caustic from spent reagent has been discussed above. No attempt has been made to investigate sulfuric acid recovery since it was felt that this would follow conventional lines. One interesting possibility presents itself in this connection. Acetic acid can be substituted for sulfuric acid and since the acetic acid can be recovered from the extract by distillation this reagent might prove more economical than sulfuric acid.

Conclusion

It has been shown that treatment of cracked distillate fuels with dilute sulfuric acid followed by caustic methanol in the absence of oxygen produces an oil of satisfactory color stability without necessity for rerunning. It is also indicated that substantially complete recovery of caustic and methanol used in the process can be accomplished.

Bibliography

1. Voorhees, V., and Shaeffer, E. J., U. S. Patent 1,810,632 (June 16, 1931).
2. Kalichevsky and Stagner, "Chemical Refining of Petroleum," p. 162, New York, Chemical Catalog Co., 1933.
3. Price, R. H., and Brandt, P. L., The Oil and Gas Journal, 33, No. 45, 54-5, 58 (1935).



Goday Cruz refinery in Argentina, S. A.

Practical Fuel Economy Methods

By M. L. COBB and H. R. WALL
Continental Oil Co.

After a year of noteworthy improvement in the efficient control of nearly all the fuel-consuming units in the manufacturing department, we must not relax our efforts and believe we have attained the utmost in fuel economy. As we become more and more proficient in the economical operation of our combustion equipment, we must now turn more to other fields if we are to continue to show decreases in fuel consumption in the future. The primary purpose of this paper is to point out the various ways and means which may be incorporated into general fuel conservation programs. We must always strive to maintain constant efficient combustion conditions; but at the same time, we must not be blind to the many other factors which materially affect the general overall fuel picture. In other words, we are generally accustomed to limiting our conversation to one or two items when speaking of furnace efficiency or fuel economy. These are damper control and burner manipulation. Actually, there are a myriad of items to be considered, and it is our plan to present all the sources of possible fuel loss and measures that can be adopted to eliminate them.

It must not be understood from the foregoing that combustion conditions are not of major importance in effecting fuel savings, and we do not propose to disregard this subject entirely; however, a great deal has already been said concerning the theory of combustion, many formulas have been propounded, many tables prepared, and yet in a large number of instances needless fuel is still being consumed.

In regard to the theory of combustion, it can be briefly stated that:

Fuel + Oxygen (air) + Heat = Combustion

The fuel must be in vapor form at the time combustion takes place; the quantity of air must be within certain limits and mixed with the fuel; and the heat must be of sufficient intensity to cause ignition.

The purpose of the burner is to properly mix the fuel and air and inject the mixture into the combustion space. The first rule for efficient combustion is:

"Always provide sufficient air to burn all the fuel and thus avoid unburned fuel loss."

Then, equally as important is the second rule, namely:

"Keep excess air at a minimum," because excess air probably accounts for the major portion of preventable heat loss in the average furnace. This is doubly true if air leakage is included with it; therefore the third rule for efficient combustion is:

"Keep air leakage at a minimum."

It may be concluded from the above that combustion control consists of admitting air and fuel into the furnace in proper proportions so that combustion will be complete without the formation of CO, that excess air is maintained at the proper low ratio, and that air leakage is eliminated if possible.

An outstanding example of the importance of combustion control is illustrated by Table 1, which shows the fuel ratio comparison of our two Cross cracking units for 1937 and 1938. The total fuel reduction amounted to 11.9 per cent, which we attribute to three factors as follows:

	Fuel saving (Per cent)
1. Reduction in excess air	8.3
2. Reduction in recycle ratio	2.8
3. Reduction due to more continuous operation	0.8
Total	11.9

We wish to emphasize the point that a relatively small reduction in excess air in connection with high exit gas temperatures produces a large percentage saving. Then in addition, if the fuel duty is large, as it was in this case, the actual fuel saving is a very substantial figure.

Reducing excess air increases furnace temperature, and it was feared that such reduction on these units would lower the stream efficiency because of overheating tubes and furnace brickwork. This contention was unfounded in this case, at least, because the records show that the units made numerous exceedingly long runs in 1938 with less than half as many shutdowns as in 1937 and with more on-stream hours.

In 1938 only one tube failure due to bulging occurred as against eight failures in 1937. While the installation of 0.5 per cent molybdenum tubes in the roof bank may have been a contributing factor, we are reasonably sure that the lowered excess air ratios are in no way harming the tubes.

Table 1 also shows how lower recirculation ratios and more continuous operation affect fuel consumption. This will be discussed later in the paper.

Table 2 shows the effect of a reduction in air filtration in a cracking still furnace. This example was taken on the No. 2 visbreaker furnace at Baltimore. On the first test, the excess

WHAT DO LEAKS COST ?

Read the Evidence

SIZE of OPENING	AIR 100 lbs. Pressure		STEAM 140 lbs. Pressure		WATER 40 lbs. Pressure		FUEL GAS 20 lbs. Pressure	
	Number of Cu. Ft. Wasted Per Month	Cost Per Month @ 5¢ per M. Cu. Ft.	Number of Lbs. Wasted Per Month	Cost Per Month @ 25¢ per M. Lbs.	Number of Gallons Wasted Per Month	Cost Per Month @ 3¢ per M. Gal.	Number of Cu. Ft. Wasted Per Month	Cost Per Month @ 12¢ per M. Cu. Ft.
1/2"	17,798,400	$ 889.92	1,085,000	$ 271.25	1,231,000	$ 36.93	5,420,000	$ 650.40
3/8"	9,979,200	498.96	620,000	155.00	692,400	20.77	3,040,000	364.80
1/4"	4,449,600	222.48	274,000	68.50	307,700	9.23	1,357,000	162.84
1/8"	1,114,560	55.78	68,000	22.00	76,900	2.31	339,000	40.68
1/16"	278,640	13.93	17,200	4.30	19,200	0.58	84,600	10.15
1/32"	69,552	3.48	4,280	1.07	4,800	0.15	21,200	2.54

OIL

	Loss in 1 Minute	Loss in 1 Hour	Loss in 1 Day	Loss in 1 Week	Loss in 1 Month	Loss in 1 Year
1 Drop Per Second	1/10 oz.	6 oz.	1 1/8 gals.	8 gals.	34 gals.	10 bbls.
2 Drops Per Second	1/3 oz.	20 oz.	3 3/4 gals.	26 gals.	2 1/2 bbls.	30 bbls.
Drop Breaking Into Stream	2 oz.	1 gal.	24 gals.	4 bbls.	17 bbls.	204 bbls.
1/8" Stream	23 oz.	11 gals.	260 gals.	43 bbls.	186 bbls.	2232 bbls.
3/16" Stream	39 oz.	18 gals.	10 bbls.	72 bbls.	309 bbls.	3708 bbls.
1/4" Stream	83 oz.	39 gals.	22 bbls.	156 bbls.	669 bbls.	8028 bbls.

air above the bridge wall was 39 per cent, which increased to 82 per cent below the convection bank, indicating 43 per cent air leakage. After this test was made the furnace was repaired and sealed to diminish the air-infiltration. This work was successful in that on the second test the excess air above the bridge wall was 27 per cent and a ratio of 39 per cent was found below the tubes, or only 12 per cent air leakage. This tabulation shows a saving of 3.31 bbls. of fuel oil per day, which was made possible by rather simple and inexpensive repairs.

Draft control is also very important in obtaining efficient furnace operation. As we have pointed out before, substantially balanced draft should be maintained above the bridge wall. The reason for this is that losses due to air infiltration and also escaping hot flue gases are at a minimum when the pressure inside the furnace is the same as outside at that point. In some cases a slight pressure on a portion of the furnace may be advantageous.

Orsat apparatus, CO_2 recorders, air-flow meters, temperature-measuring devices, and many other instruments are used to reduce fuel losses by controlling excess air, air leakage, and flue gas temperatures. Much time and effort on the part of testers, engineers, and operators has been necessarily expended and to good advantage on combustion control, and we recommend that this procedure be continued. Again this is bordering on the already much-discussed mechanics and technique of burning fuels; and assuming that we already have a clear understanding of what constitutes efficient combustion control, we shall now endeavor to point out at least some of the other factors which, if given proper attention, can reduce overall plant fuel consumption.

The major items affecting fuel conservation, assuming efficient combustion control, are:

1. Physical condition of furnace and equipment.
2. Operating control.
3. Utilities.
4. Other miscellaneous factors.

We have prepared a four-page form to thoroughly cover all of the items under each of these headings. In Ponca City it is the plan to make a standard practice of filling out similar forms for each of our fuel-consuming units once or twice a year, or oftener if it is found advisable. Such an inventory of all possible sources of fuel loss will prove enlightening.

1. Condition of furnace and equipment.

Table 3 shows a complete form filled out for one of our crude pipe stills. The first item on the list is heating surface. Heating surfaces frequently become very dirty, particularly in convection sections; and the result is a materially decreased heat transfer rate. The use of soot blowers, handlancing with steam, and even washing the tubes with water may be required to keep them clean. Sometimes additional clean-out and inspection doors are necessary for this purpose.

At Baltimore we have a severe problem in maintaining clean tubes. Because of the high salt concentration in the fuel oil, heating surfaces at this refinery are being continually coated with a hard glazed deposition, which seriously impairs heat transfer rates. The personnel at this refinery will have to concentrate every effort to keep this deposition to a minimum. Plans are now under way to install crude desalting equipment in the producing field.

The heater tubes should obviously be maintained in good state of repair. In most cases it is impractical to change the design of existing units, but new furnaces should be constructed so that

TABLE 1—EFFECT OF EXCESS AIR AND OTHER FACTORS ON CRACKING STILL FUEL CONSUMPTION

	1937	1938
Hours in operation	14,318	15,275
Number of shutdowns	26	11
	(Pct.)	(Pct.)
Excess air:		
Over bridge wall	57	48
Stack	82	69
Stack temperature	904	881
	(Pct.)	(Pct.)
Stack gas loss	39	34
Miscellaneous lost—estimated	6	6
Furnace efficiency—by difference	55	60
Increase in furnace efficiency	..	5
Fuel reduction	..	8.3
Oil recirculation ratio	4.15	4.02
Par fuel ratio	8.94	8.69
Par fuel ratio reduction	..	.25
Fuel reduction due to lower recirculation ratio, per cent	..	2.8
Fuel ratio	8.94	7.88
Fuel ratio reduction	..	1.06
Total fuel reduction, per cent	..	11.9

	(Pct.)
Fuel reduction due to lower excess air ratio	8.3
Fuel reduction due to lower recirculation ratio	2.8
Fuel reduction due to more continuous operation	0.8
Total fuel reduction	11.9

Cracking Still Fuel Consumption Comparison

Year 1937:	
Charge	1,342,519
Equivalent fuel oil	120,139
Fuel ratio	8.59
Year 1938:	
Charge	1,536,656
Equivalent fuel oil	121,078
Fuel ratio	7.88
Barrels fuel at 1937 ratios	137,522
Savings—equivalent bbls. fuel oil	16,444

cleaning and repairing tubes and stopping air leaks is as convenient as possible.

Furnace brickwork should be so maintained as to prevent air leakage. The use of air-cooled walls in place of solid brick walls must be considered not only from a maintenance point of view but also from a fuel standpoint. Air-cooled walls must be so designed that air-infiltration is at a minimum and also that air-cooling can be controlled in order to reduce heat loss.

We have one example of an air-cooled wall furnace in which the combined loss due to air leakage and heat loss resulting from air-cooling has increased the fuel consumption of the unit about 25 per cent. In some cases air-cooling of the walls is unnecessary because of moderate firing, and the air inlet and outlet ports can be partially or wholly plugged, thereby reducing the unnecessary heat loss. This was done in the case of one of our small pipe stills with very noticeable results.

Complete elimination of air leakage is almost impossible in most of our present units; therefore it is a problem that requires continuous attention. Tight furnace walls, well-packed tube sheets, and low furnace drafts are the three main points to watch in keeping air leakage at a minimum.

Insulation of furnace walls, hot oil lines, exchangers, steam pumps, etc., must be maintained in good condition. Loss from poor, or no insulation, can be of considerable importance. The heat loss from hot oil lines is high in normal weather and becomes tremendous during rain and high wind conditions. Unstable operating conditions during periods of inclement weather also result because of improper and insufficient insulation. Well insulated hot oil lines, and towers, are not greatly affected by sudden atmospheric changes; and this fact, as well as the saving in fuel, should justify ample insulation.

TABLE 2—FUEL SAVING DUE TO DECREASING AIR LEAKAGE-VISBREAKER FURNACE

	Before sealing	After sealing
Above bridge wall:		
Excess air, per cent	39	27
Flue gas temperature, deg.	1,472	1,550
Total heat content—B.t.u./hr.	11,950,000	11,770,000
Difference	180,000	
Below tubes:		
Excess air, per cent	82	39
Air leakage, per cent	43	12
Flue gas temperature, deg.	720	770
Total heat content—B.t.u./hr.	6,840,000	5,780,000
Difference	1,060,000	
Minus difference at bridge wall	880,000	
Barrels fuel saving per hour	.138	
Barrels fuel saving per day	3.31	

The stacks, dampers, breeching, draft doors, and air shutters must be maintained in good operable condition if efficient control is to be secured. The draft gauge is a very important control instrument, not only for efficient combustion control, but also as stated above from the standpoint of minimizing air leakage. It should therefore be in good condition at all times, and connections should be installed for reading the draft at all vital points, particularly above the bridge wall, at the top of the furnace, and below the convection bank. Flue gas sample connections should also be made at the above locations and manifolded at a common point for easy access. It has been our experience that, by the simple expedients of making draft and sample connections accessible, more numerous and accurate tests will be made because of the ease of securing samples. This very point has been one of great importance in the better control of our furnaces over the past year.

Burners, next on the list, are of course of utmost importance in securing efficient combustion and must be maintained in a good state of repair and reasonably clean at all times. It is not the purpose of this paper to discuss burner design, but we must insist that careful attention be given these units.

Furnaces equipped with forced and induced draft fans and flue gas recirculation are of course dependent on them for efficient results; therefore they should be in good condition in order to provide constant service. The loss of a hot gas recirculating fan on a Dubbs unit means a drop in charging capacity and an increase in fuel consumption of 20 to 80 per cent, depending upon the reduction in throughput. If a very low throughput is resorted to, less excess air is required and the fuel increase is on the order of 20 per cent. Usually, for operating reasons, the throughput is maintained as high as possible by introducing the maximum amount of excess air obtainable and the fuel loss is of the magnitude of 80 per cent.

Gas pressure regulators functioning properly will tend to promote uniform firing and efficient results. A transfer temperature controller properly maintained will go still further in providing uniform firing conditions and subsequent fuel economies in addition to better operation of the still. These instruments therefore merit close attention at all times.

Soot blowers, although sometimes unjustifiable in units burning clean fuel, will often prove valuable in keeping tubes clean on the outside and thus help in accomplishing maximum heat transfer rates.

Air preheaters and economizers are heat conservation contrivances that may or may not offer sufficient earning to warrant new installations; but all present equipment should be made to produce the maximum returns possible. In both cases clean surfaces are of utmost importance. The heat in the flue gases leaving the main unit and also that picked up by the oil or air must be conserved. Adequate insulation and prevention of air leakage are the two main points to watch.

The new waste heat boiler at Denver can be placed in the class of preheaters or economizers. This is an example of obtaining further benefit from the heat in the flue gases leaving a cracking furnace. That this installation has been successful in reducing fuel costs is evidenced by a

SAVES MANY EXPENSIVE TRIPS

Instead of having to send your men to widely scattered places to study the latest equipment, leading manufacturers bring their equipment to one place . . .

the OIL-WORLD EXPOSITION located at the world's oil center

Here the conditions are ideal, for the manufacturer is prepared to give a complete demonstration of his products and leave with you descriptive literature.

SAVES VALUABLE TIME

In one week, your men can examine more equipment than they could see in months if they had to visit the plants of the 700 manufacturers. This saving in time can be devoted to productive work for you.

INSTRUCTIVE DISCUSSIONS

ON THE MOST MODERN PRACTICES will be given by the greatest teachers of all—men who are proving their theories every day by doing their jobs efficiently in the oil fields and refineries.

BIG HOUSTON:

THE BIGGEST CITY IN THE BIGGEST STATE CAN TAKE GOOD CARE OF EVERYBODY

ALL ACTIVE OIL MEN

in every part of the world

Your operating executives, engineers, and technical men will study and compare

$15,000,000.00 WORTH OF OIL INDUSTRY EQUIPMENT

At HOUSTON ★ APRIL 24-29th

Write for details to ED. G. LENZNER, General Manager Oil-World Exposition, Inc.
Petroleum Bldg., Houston, Texas

OIL WORLD EXPOSITION

PETROLEUM BUILDING HOUSTON, TEXAS

decrease from .2535 bbl. of fuel per thousand pounds of steam in 1937, to .1476 in 1938. In the case of air preheaters, care must be taken to make sure that the maximum amount of air used by the burners is preheated air and not cold air from air leaks around burners or air ducts.

Exchangers, the last item on the list, are in many cases the most important factor in fuel economy. Every heat unit picked up by oil in the heat exchanger means from 1.5 to 2.0 heat units of fuel saving. Exchangers must be kept clean and records accumulated to determine when cleaning is necessary and profitable. The merits of a regular cleaning schedule governed by fouling rates have often been pointed out. The transfer rates for clean tubes are often lowered as much as 30 per cent by almost insignificant fouling deposits, but when more severe conditions exist, the actual rate may be as low as 10 per cent of that for clean equipment.

Exchangers must likewise be maintained in good repair or outages will occur. In order that an exchanger may be cleaned or repaired while the unit is on stream, a manifold can often be justified to permit by-passing for repairs. In some cases, it may only prove economical to provide sufficient valves to by-pass a group of exchangers at a time. In all cases, however, the maximum results can be secured if it is possible to by-pass single units. If an entire battery of three exchangers is by-passed, all of the available heat pick-up will be lost; whereas, if only one exchanger is fouled and can be by-passed separately, less than a third of the available heat pick-up is lost because of the increased output of the remaining two units.

The importance of keeping exchangers in service is illustrated in Table 4. With the vapor-oil exchangers out of service on this unit, a fuel loss of 30 bbls. per day was sustained due to lower preheat temperatures. In addition, the loss of condensing action in the vapor stream resulted in increased tower pressures. This necessitated a reduction in charge of 3,000 bbls. per day. It is apparent that these exchangers should never be out of service simultaneously and the value of proper manifolding and maintenance of tubes is obvious.

2. Operating control.

In addition to the proper combustion control of the furnace itself, discussed earlier in the paper, there are several other operating factors which materially affect fuel ratios.

Under the heading of "Charge to Units," the rate of charge is sometimes a major factor in fuel consumption. For the particular battery studied, containing one pipe still, five shell stills, an economizer, and a bottoms exchanger, the fuel consumption is materially lower at a high charge rate than for a low charge rate. This will generally be true with all units to some degree, at least, up to a charge rate that is beyond optimum capacity of the unit.

Uniformity and continuity of operation at the maximum charge rate are also important factors. It is generally recognized that total refinery fuel demands are comparatively inelastic if the fuel requirements at the stills are omitted; therefore total heat requirements do not increase in direct proportion to the oil charged. In other words, with an appreciable increase in the percentage of charge the fuel requirements over a period do not increase in direct proportion. This fact is reflected in the data given in Table 1 and brings out the importance of securing as long runs as possible. This can be accomplished by improving operating efficiency and striving for mechanical perfection.

The type of operation oftentimes makes a

TABLE 3—FUEL CONSERVATION REPORT—CRUDE PIPE STILL

1. Condition of Equipment

Equipment—	Design	Repair	Cleanliness
1. Heating surface	(1)	OK	(1)
2. Brickwork, furnace	(2)	(2)	...
3. Air leaks, furnace	...	Too high	...
4. Insulation, unit	...	OK	...
5. Stack	OK	OK	OK
6. Stack dampers	OK	OK	OK
7. Breeching	OK	OK	OK
8. Draft doors	OK	Warped	OK
9. Air shutters	OK	OK	OK
10. Draft gauge	OK	OK	OK
11. Gas burners	OK	OK	Fair
12. Oil burners	OK	OK	OK
13. Gas pr. reg.	Fair	OK	OK
14. Temperature control	OK	OK	OK
15. Charge control	OK	OK	OK
16. Induced D. fan	None	...	...
17. Forced D. fan	None	...	...
18. Air ducts	None	...	...
19. Hot gas fan	None	...	...
20. H.G.F. motor	None	...	...
21. H.G.F. suction	None	...	...
22. H.G.F. discharge	None	...	...
23. Soot blowers	OK	(3)	Dirty
24. Air preheater	None	...	...
25. Economizer	None	...	...
26. V. to oil exch.	OK	(4)	OK
27. Gas oil exch.	OK	OK	(5)
28. Wax exch.	OK	OK	(5)
29. Bottoms exch. No. 23	Fair	OK	(6)
30. Bottoms exch. No. 51	Fair	OK	(6)

Remarks

(1) Plan to clean convection blank January 16, 1939. Additional cleanout doors may be required.
(2) Solid brick walls bulge badly due to high furnace temperatures. All three sides are badly bulged, and the west wall is particularly bad. It is planned to repair it January 16, 1939.
(3) Four of the six soot blowers do not operate properly. These will be repaired January 16, 1939.
(4) The vapor to oil exchangers has had to be cut out frequently to replace tubes.
(5) Believe OK.
(6) Checked OK.

2. Operating Control

1. Charge—rate	OK
2. Charge—uniformity	OK
3. Charge—temperature	OK
4. Kind of operation	Too many changes (1)
5. Reflux rates	OK
6. Recirculation ratio	...
7. Furnace temperature	(2)
8. Top furnace draft	Zero—OK
9. Excess air	20% to 40%—OK
10. Balanced burners	OK
11. Oil flow distribution	Fair

Remarks

(1) Numerous changes in operation are made on this unit that result in operating irregularities and some waste of fuel.
(2) The thermocouples, now called furnace couples, are located over the convection bank; and due to this unit's having two rows of roof tubes, they do not give the actual furnace temperature. Since it is the roof tubes in this unit that are the most critical from a control standpoint, the furnace couples should be relocated to give a temperature of more value in preventing damage to the roof tubes.

3. Utilities

1. Gas:	
Leaks	OK
Pressure regulation	OK
Uniformity of quality	OK
Cleanliness	Fair
2. Oil:	
Leaks	Several
Spills	OK
Slop	Too high
Rerun	Too high
3. Steam:	
Leaks	Too many
Unnecessary operation of pumps	OK
Excessive use of process	OK
4. Electricity:	
Unnecessary operation of pumps	OK
Unnecessary burning of lights	OK
5. Water:	
Leaks	OK
Unnecessary use of	OK
6. Air:	
Leaks	OK
Unnecessary use of	OK
Excessive use of	OK

Remarks

Bad steam leak on hot oil pump turbine, and bad oil leak from pump on suction side.

4. Miscellaneous Factors Affecting Plant Fuel Consumption

Inefficient pumps	Charge pump
Excessive discharge pressure	Charge pump
Faulty mechanical equipment	OK
Shutdowns, delay time	OK
Operating irregularities	Too many changes
Atmospheric conditions, lack of protection from same	OK
Poor water treatment—scale	(1)

(1) Closed coolers require frequent cleaning to prevent hard scale deposition.

Can Fuel Consumption Be Further Reduced

With present equipment? Yes.
If so, how? By obtaining a higher average preheat temperature; by cleaning the furnace tubes; and by closer furnace control—more tests.
If not, why not? ——
With new equipment? Yes.
If so, how? A CO_2 recorder would assist in maintaining the minimum excess air possible.
Ig not, why not? ——
Is the above new equipment practical? Yes, if we can get a reliable instrument.
This report was made by the combustion engineer in conjunction with the inspector and operating personnel.

major difference in the fuel ratio of a unit and should be considered in all comparisons of fuel consumption. We recognize the fact that a unit must be operated consistently with the demand for products but we wish to point out that less frequent radical changes will reduce fuel consumption. A change usually means a period of time when products do not meet specifications; resulting in production of slop, or rerun, and some unprofitable fuel consumption.

Reflux rates on some units affect the recirculation ratio of hot oil through the furnace, and this materially affects the fuel consumption. For the maximum fuel efficiency on any unit, the oil charged through the furnace tubes must be kept as low as possible in proportion to the raw oil charge.

On some units, it is necessary, in order to avoid damage to furnace tubes, to set a maximum temperature limit for the furnace gases in the combustion chamber or over the bridge wall. This often results in the use of more excess air than would otherwise be required for combustion. For this reason furnace temperature limits should be set as high as possible, keeping in mind overall fuel economy and at the same time not forgetting furnace maintenance.

Furnace draft, already discussed to some extent, is a vital control point. By proper handling of stack dampers and the means for admitting air, a zero draft at the top of the furnace or over the bridge wall can be maintained regardless of the amount of excess air.

The effect of excess air has previously been mentioned.

Balanced burners result in uniform duty on both the fire box and the tubes, which is very essential in avoiding damage due to overheating in heavily fired units. Balancing of burners is also required to secure uniform flue gas distribution throughout the furnace, which is essential when making furnace tests.

In units having two or more banks of tubes in parallel, the flow of oil through each bank must be the same to obtain the best results.

3. Utilities.

The proper handling, use, and conservation of utilities are very important factors in the overall refinery fuel consumption picture.

Gas, oil, steam, water, and air lines must be inspected thoroughly and periodically to detect and eliminate leakage. Wastage of any of these represents an unrecoverable loss and adds directly to plant fuel consumption.

It is interesting to note that air, which is often used as though it had no value, is the most costly of all utilities at generally prevailing pressures.

Leaks Must Be Eliminated

An interesting example of fuel gas leakage occurred at the gasoline recovery plant at Ponca City this last year. In July 1938 the fuel ratio was .0024 per cent. In August a large leak was found and repaired, and the fuel ratio dropped to .0016, and then on down to .0010 in September. This leak was discovered because a check of the records revealed a high fuel ratio was being experienced on this unit, and a request was made by the fuel department for the line to be uncovered and checked for leaks.

Proper pressure regulation, uniform quality, and freedom from liquid or other foreign matter are essential to best results from gas fuel. In the case of fuel oil, proper temperature is also essential.

Oil spills and slop oils from any source usually mean rerunning through stills, and thus more

fuel consumption. For this reason, as well as others, they should be reduced to a minimum.

Steam, electricity, water, and compressed air are often wasted by either unnecessary or excessive use. Those responsible for their use should periodically examine every operation involving the consumption of these commodities and rejustify not only their use in each case, but also the amount, or eliminate their use entirely. Three examples of the unnecessary or excessive use of these commodities are offered as follows:

1. Unnecessary operation of pumps is likely to be a common occurrence if not checked occasionally.

2. The use of compressed air for any unjustifiable purpose such as drying a floor after washing with water is an unpardonable waste of fuel.

3. The excessive use of snuffing steam in header boxes has long been a bone of contention. If reasonable care is used in handling fittings and heading up the furnace, small leaks will ordinarily coke up after the unit is on stream. The snuffing steam should then be pinched down and turned off when possible.

In regard to steam and electricity, their proper generation and application play an important part in plant fuel consumption, but a thorough discussion of this subject is considered beyond the scope of this paper. Power generation and application surveys have been made and others will be made in the future, and each of you should be alert to improvements along this line. An interesting example of what is meant by these remarks was recently demonstrated in Denver. It was found that by installing capacitors in the power system an earning of $226 a month was made possible by the mere correction of power factor. This earning shows the attractive return of the investment in 22 months.

4. Miscellaneous factors affecting plant fuel consumption.

Inefficient pumps and prime movers are often the cause of considerable wastage of fuel, and tests of such equipment should be made where there is a possibility of improvement.

Excessive pump discharge pressures resulting from undersized lines or overspeeded pumps cause unnecessary power consumption as well as damage to equipment.

Faulty mechanical equipment, resulting in shutdowns or delay time in getting a unit back on stream, frequently causes unnecessary use of fuel, as well as other expense. You are all quite familiar with the many numerous expenses incurred by shutting down equipment but perhaps not always cognizant of the fuel cost. Warming up a cold unit and bringing it on stream are always big items from a fuel standpoint and still larger if delay time occurs. See Table 5. This tabulation shows that with a normal 12-hour shutdown, the fuel used for heating up the unit amounts to 12.3 per cent of the total fuel used during the run, while with 18 hours' additional down time, this heating fuel increases to 14.6 per cent.

We should therefore do all we can to eliminate unnecessary shutdowns and delay time; nevertheless, there is a stage in some runs when it becomes more economical to bring units down, to clean tubes and exchange equipment, and make other repairs rather than continue to operate inefficiently.

Irregularities due to changes in operation, power failures, fuel troubles, mechanical equipment failure, and any other cause often result in off-specification products, rerunning, and extra fuel consumption.

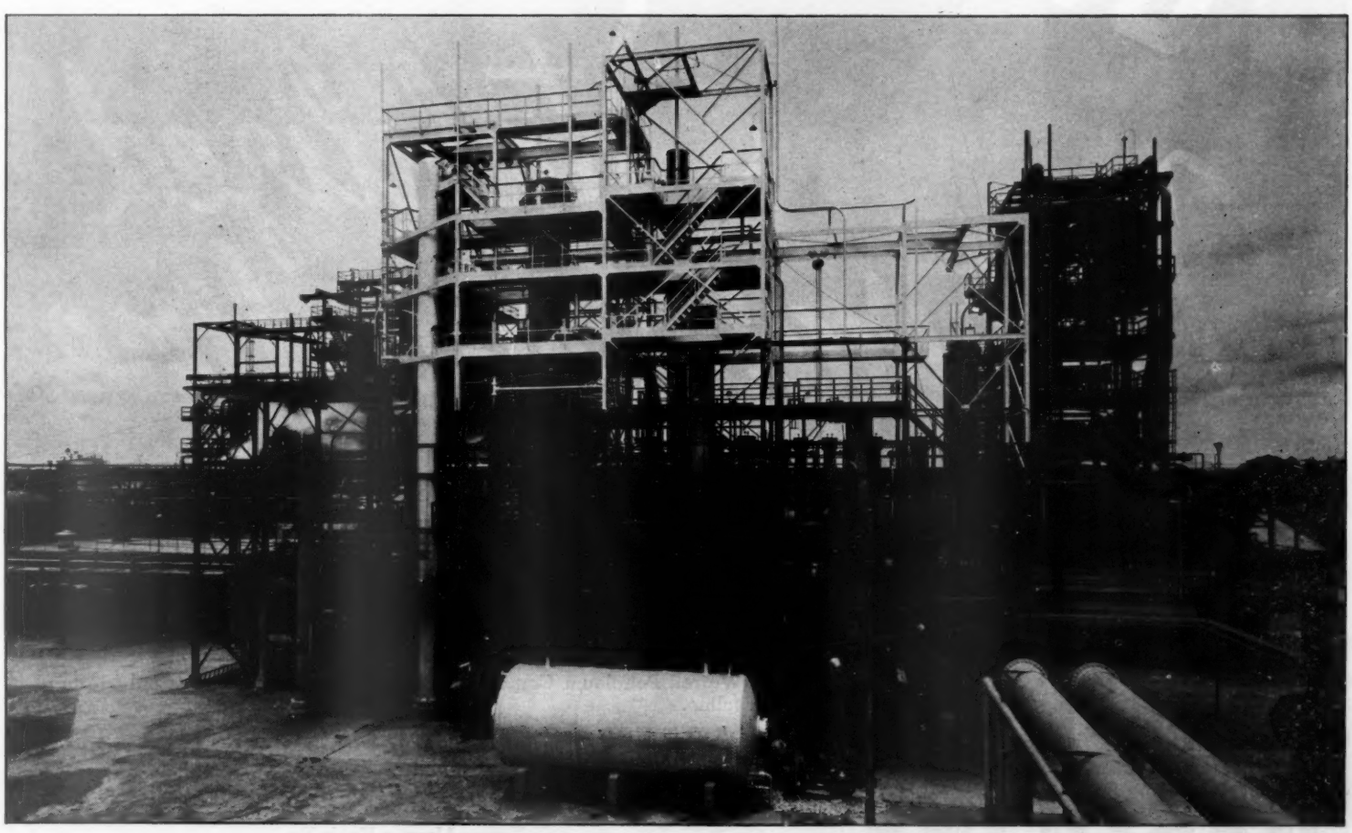
Can Fuel Consumption Be Further Reduced?

Under this last heading we come to the point where the importance of each item previously considered must be carefully weighed and definite action taken. Some faults can be corrected immediately, and others will require engineering and further study and justification. All possible means of reducing fuel with present equipment should first be exhausted and then new equipment be considered. Simple changes or additions will often produce surprising results. Theoretical calculations and data as gathered by engineers and process technologists, etc., can usually be relied on to predict the results of new equipment.

Records

We have found that accurate and complete records are one of the most valuable tools in decreasing fuel consumption. One of the most necessary of these is the record of temperature rise through heat exchangers and charge to furnaces. A good proof of this was brought to our attention at the Ponca City refinery this year. It was noted that the contact still fuel ratio for 1938 was much higher than for 1937 and 1936, and very large losses were shown by regular comparison. When the possible causes for this increase were investigated, it was found that the temperatures of the oil entering and leaving the still had not been recorded. As a result there was no basis for establishing a comparison. In other words, it was not known whether a heavier load was being imposed on the furnaces this year, hence it was almost impossible to ascertain the location of the trouble.

As a matter of interest, after considerable de-



Stabilization and polymerization unit feed-recovery installation. Includes after-fractionator, absorber tower, stabilizer column and depropanizer. Unit located in Atlantic Refining Co.'s plant at Atreco, Tex.

JUST NATURAL GASOLINE

By "rail or sail" Warren can supply your needs for *Stabilized* Natural Gasoline, the important factor in modern motor fuel. The increased volatility and high octane rating of Warren Stabilized Natural Gasoline, when properly blended, insures a knockless, quick-starting, carbon-free, uniform gasoline.

Refiners throughout the world look to Warren for their Natural Gasoline needs. The entire production of a large number of plants is quickly available through adequate transportation and storage facilities.

Warren Petroleum Corporation manufactures and markets only Natural Gasoline.

WARREN PETROLEUM CORPORATION
Tulsa, Oklahoma
MANUFACTURERS, EXPORTERS AND MARKETERS
Export Terminals: Corpus Christi, Port Arthur and Norsworthy, Houston, Texas; Marcus Hook, Pa.

tailed work and survey, the following recommendations were made and followed for these stills:

The excess air was lowered somewhat through the furnace but not appreciably. The air leakage in the tube header bank was diminished somewhat by sealing up leaks. The convection bank tubes were found to be dirty, and foreign matter was removed by hand-lancing and steaming. This still is equipped with air-cooled walls which are inefficient in so far as fuel consumption is concerned. Therefore, because of the rather low furnace temperature, the air flow through the walls was decreased as much as possible. It was also recommended that better records be kept of the temperatures on this unit. It is interesting to note that after these changes were made, although only one of these stills was in operation and under reduced charge, the remainder of the year showed a 100-bbl. fuel decrease. Just what per cent of the saving was due to the changes made is unknown because of the lack of records to compare the heat load of the furnace with the previous years.

The location of the leak in the G.R.P. fuel gas line previously mentioned is another example of the value of records.

It is the opinion of the combustion department that our regular system of fuel comparison, that is, of applying previous year's ratios to the current year's changes, is a record of considerable value even though any such system has inherent disadvantages. When the figure so obtained is compared with the current year's fuel consumption, the losses or savings shown are truly indicative of the fuel performance of the unit. In addition, the increased interest and competitive spirit that this comparison has inspired among departments and refineries has contributed materially to the present trend of decreased fuel consumption. For example see Table 1.

Now, having convinced ourselves of the fact that accurate and complete records are important and necessary, we must not forget to use them. Each operating foreman and superintendent should daily scrutinize a sheet showing charge rates, temperatures, recirculation ratios, and fuel ratios. See Table 6. Experience will enable them to define fuel problems quickly and easily. It should be an operating duty, the same as controlling temperatures and gravities, for each operator to keep fuel costs at a minimum.

Another point we believe to be important is that the best time to inspect a unit relative to its fuel efficiency is during the semiannual or general inspection. Future unit inspections should keep fuel economy in mind, and the inspector should give considerable attention to the items listed in the fuel conservation report as well as to safety. Complete cooperation between the inspection and fuel departments is essential.

We wish to summarize at this time all of the most important factors to watch in fuel conservation. This subject is necessarily affected by numerous small details which must not be overlooked if real fuel economy is to be manifested; still all of these items fall under the general topics listed below:

1. *Complete combustion.* At no time should there be CO in the stack gases. The loss due even to a small percentage of this gas is appreciable, and sufficient air should be admitted to the combustion chamber to eliminate it.

2. *Low excess air.* This item has already been discussed at considerable length. Excess air may be maintained at a low figure by manipulation of dampers, burners and recirculating fans. Each unit and each furnace by now has its established optimum excess air ratio. Every effort should be made to maintain these ratios at all times. Frequent furnace tests, if given proper attention by the supervisory staff, will reap the rewards which have been pointed out.

TABLE 4—EFFECT OF HEAT EXCHANGE ON CHARGE RATE AND FUEL CONSUMPTION—CRUDE PIPE STILL

	December 10-12, 1938	December 13-20, 1938
Vapor to oil exchangers	Out	In
Charge rate—bbls. per day	8,196	11,205
Rate increase		3,009
Inlet oil temperature, °F.	220	316
Temperature increase		96
Fuel ratio	1.65	1.38
Fuel ratio decrease		.27
Fuel saving—bbls. per day		30

TABLE 5—EFFECT OF DELAY TIME DURING CLEANOUTS ON FUEL CONSUMPTION—CRACKING STILLS

Date—	Unit No.	Hours for cleanout	Hours to get on stream	M. ft. gas to get on stream
12-15-38	3	36	5	111
12-18-38	3	12	4	85
11-22-38	1	28	5	114
11-25-38	1	12	4	78
11-26-38	2	25	5	107
11-19-38	2	12	4	83
Average all stills		30	5	111
Average all stills		12	4	84
Difference				27
Difference as barrels of fuel oil				7.4

Fuel ratio with normal cleanout time	6.00
Fuel ratio with 12 hours extra cleanout time	6.13
Increase in fuel ratio because of delay time	0.13
Total fuel consumed—normal cleanout, bbls.	349
Fuel consumed getting on stream—normal cleanout, bbls.	43 (12.3%)
Fuel consumed getting on stream—18-hr. delay time, bbls.	51 (14.6%)

TABLE 6—SUGGESTED RECORDS FOR FUEL CONTROL

Cracking Still

Date	Raw oil charge	Comb. feed temp.	Transfer temp.	Hot oil charge	Recirculation ratio	Fuel ratio
1- 9-38	2,260	660	925	9,500	4.2	9.05
3-20-38	2,500	660	925	9,500	3.8	8.37

Crude Still Battery

		Charge temperatures				
Date	Charge rate	From tank	From exch.	From econ.	To P.S.	Fuel ratio
8-9-38	7,000	92	185	238	240	2.74
12-1-38	5,670	60	139	Out	140	3.78

Crude Pipe Still

		Charge temperatures				
Date	Charge rate	From tank	From exch.	Fm. fl. twr. to P.S.	Tr. temp.	Fuel ratio
12-1-38	10,750	50	346	368	582	1.14
1-15-39	9,580	49	301	337	580	1.37

3. *Minimum air leakage.* Loss due to air leakage is a major one in refinery furnaces. Ten per cent air leakage through the convection bank of a furnace results in about 1.5 per cent fuel loss. Over a day's period of time, many barrels of fuel are required to heat up the cold air leaking into the furnace in order that heat transfer rates may be maintained.

4. *Proper maintenance of all equipment.* This subject has been discussed in considerable detail, and the many factors which must be analyzed in order to realize the maximum from the fuel are important.

5. *Heat exchange.* Clean and well-designed exchangers often are a most important factor in fuel conservation. Exchanger maintenance is a specific problem in itself requiring that scientific methods and regular schedules be employed if best results are to be obtained.

6. *Careful operating control.* We all agree that continuous uniform operation is the goal to be attained if maximum earnings are to be expected. From the fuel standpoint, this is also a major and important factor because when a unit is shut down other plant fuel costs go on, and the over-all fuel cost per barrel of crude processed mounts. The small plants, namely, Farmington, Albuquerque, and Lewistown, which have little control over this factor, are keenly aware of the way in which reduced charges penalize them.

7. *Conservation of all utilities.* Along with the unnecessary operation of pumps, improper use of steam, air, etc., is the item of loss of such utilities through leakage. We believe the chart we have referred to demonstrates very clearly the surprising magnitude of leaks which are so small as to be passed over as negligible.

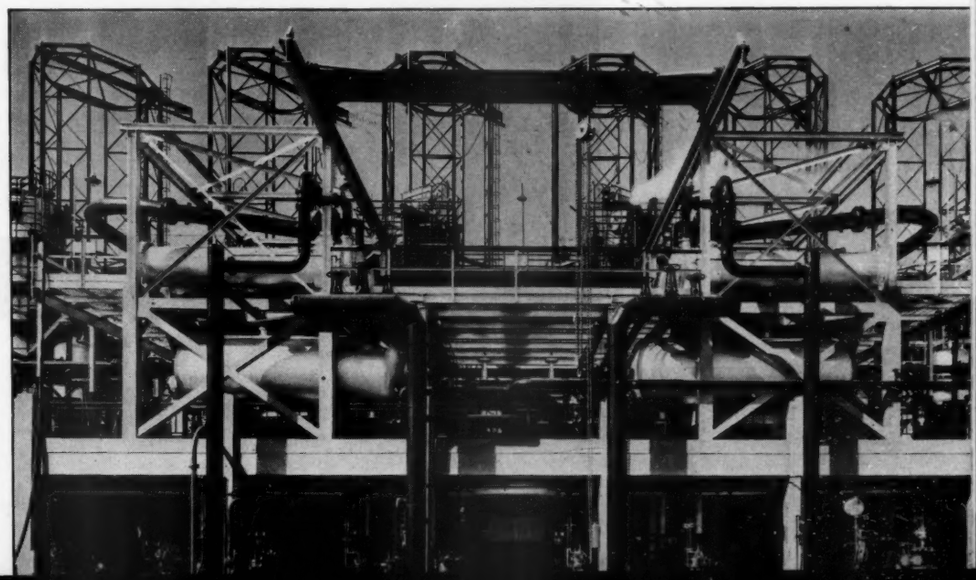
8. *Miscellaneous factors:* In addition to the above-mentioned sources of fuel loss are miscellaneous factors such as inefficient pumps, poorly maintained and improper use of mechanical equipment, operating irregularities, etc. The attendant fuel loss due to unnecessary and prolonged shutdowns resulting from equipment failure is best illustrated by the example shown.

9. *Records.* Complete and accurate records should be maintained on all fuel consuming units. Each superintendent and supervisor should avail himself of them and devote a reasonable portion of his time to fuel conservation surveys. These records are of no value if they are not used.

The record of the manufacturing department over the past year indicates what can be done when we apply ourselves, and surely there are increased savings to be made by employing all of the methods outlined. We believe that we have only scratched the surface in the reduction of our fuel bill. As time progresses, diligent study and work on this problem will benefit not only the company and ourselves, but also it is a step towards the conservation of the nation's resources. Certainly continued progress along this line is commendable.

✣ ✣

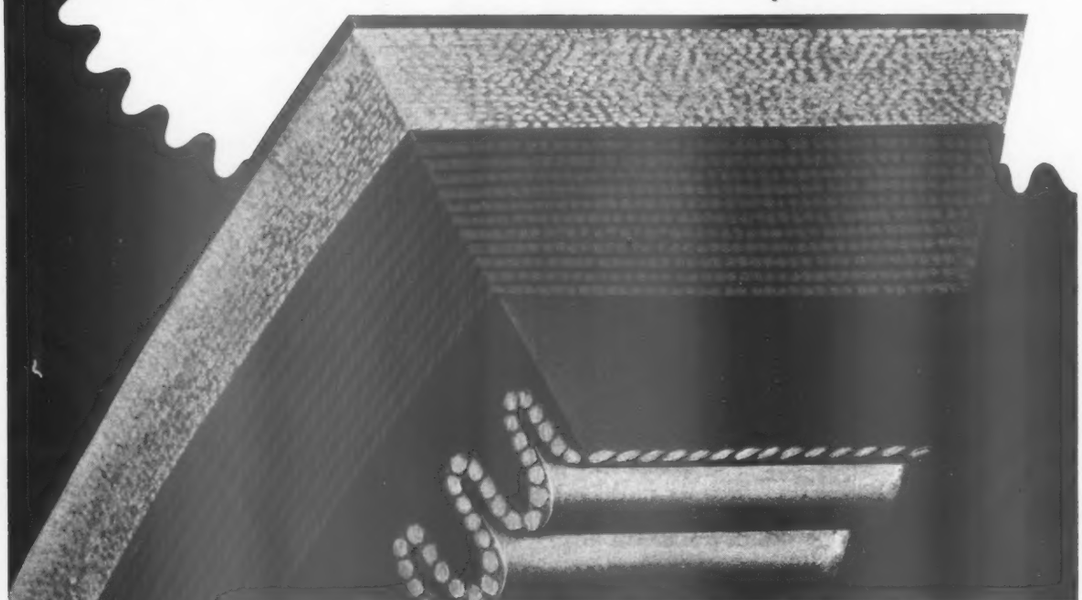
General view of cold-oil pump room and control house with super-structure of the De Florez heaters in the background. Unit located in Richfield Oil Corp. refinery, Watson, Calif.



From the Research

THE WORLD'S LARGEST MAKER

IMPROVED Super-Flex



Outstanding in Basic Scientific Design—the Improved Super-Flex Dayton Cog-Belt with Daytex Cord Gives You These EXCLUSIVE Advantages of Cooler Running, Longer Life

Built to Bend

In Dayton's convolute layer construction the entire belt is built to bend—less internal strain—longer life. And because of the cross-wise rigidity, Dayton Cog-Belts ride true in the pulley grooves. No twisting—no distortion—cooler running, longer life.

Patented Cog Construction

Dayton's patented cogs close up when the belt goes around the pulley—and take up the compression on the inside of the belt. Another reason why Super-Flex Dayton Cog-Belts are more flexible—cooler running and longer lasting.

Greater Gripping Power

Because of their die-cut sides Dayton Cog-Belts have greater gripping power—the highest coefficient of friction of any belt.

Laboratories of

OF V-BELTS COMES THIS

DAYTON COG-BELT WITH DAYTEX CORD

In millions of applications, Dayton Cog-Belts have established remarkable records for long life—for the delivery of smooth, silent, constant driving power at low cost. Now, Dayton, the pioneer in the latexing of cord for V-Belts, brings you another revolutionary development—the improved Super-Flex Cog-Belt made with Daytex Cord.

Cooler Running

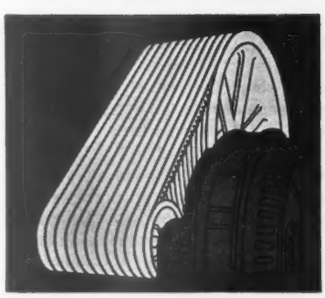
Cooler running because it defeats life destroying internal heat, this improved Super-Flex Dayton Cog-Belt with Daytex Cord is the result of 7 tireless years of tests and research by Dayton's famed technical laboratories. This long-lived Daytex Cord—with inter-locked non-slip fibres—latex processed by exclusive patented Dayton equipment—sets an entirely new standard of strength and compactness—it's a cord with minimum stretch—a cord with super-flexibility.

Longer Life—Fewer Adjustments

Today, this compact, Super-Flex, stronger Daytex Cord in the neutral section of Dayton V-Belts sets a new standard of long-lived power transmission. The improved Super-Flex Dayton Cog-Belts last longer than ever before. Maintenance costs are still lower because fewer adjustments are necessary! No slip—no stretch. These Super-Flex Daytons deliver positive, dependable, shock-proof power.

Learn first-hand what this improved Super-Flex Dayton V-Belt can mean to you in increased production with lower cost. Write for the facts today.

THE DAYTON RUBBER MFG CO.
DAYTON, OHIO



Whether for fractional or a thousand horsepower—there is a Dayton V-Belt Drive for the job.

Dayton
COG-BELT DRIVES

Extensions at Abadan Refinery of Anglo-Iranian Oil Company

The Abadan refinery of the Anglo-Iranian Oil Co., Ltd., is situated 25 miles from the mouth of the Shatt-al-Arab River at the head of the Persian Gulf. Its throughput has increased from 5,000,000 long tons of crude in 1928 to 7,000,000 tons in 1933 and 10,000,000 tons in 1938. During the same period the character of the operations carried out has been greatly changed.

Ten years ago, straightrun gasoline and kerosene and fuel oil residuum formed the bulk of the products. Nowadays, however, most of the gasoline is either re-formed or produced by cracking heavier stocks, kerosene is subjected to sulfur dioxide extraction both to improve its burning quality and to recover the valuable aromatic contents of the extract, and the furnace oil produced has been greatly improved as regards set point by blending with certain distillate fractions and asphaltic residues. In addition, high octane rating aviation spirits are made, largely by polymerization and hydrogenation of straightrun and cracked gases, gas oil of particularly high quality has become a major product, and a full range of road asphalts and cut-backs find a rapidly growing market.

From this it follows that the doubling of the throughput has been accompanied by a much more than proportional increase in the amount of plant in use; moreover, the plant that sufficed for the simple topping operations formerly carried out has been rendered obsolete by the process developments of the last few years, and, although the refinery has been in operation since 1913, most of the plant now in use is of advanced modern design, while the replacement of the older and less efficient equipment is continuously going on concurrently with the additions made necessary by throughput increases.

The crude now processed at Abadan is a mixture from the two principal Iranian producing areas of Masjid-i-Suleiman and Haft Kel, and on A.S.T.M. distillation gives yields approximately as follows:

To 150° C.	20% by vol.
200° C.	33% by vol.
250° C.	44% by vol.
300° C.	56% by vol.

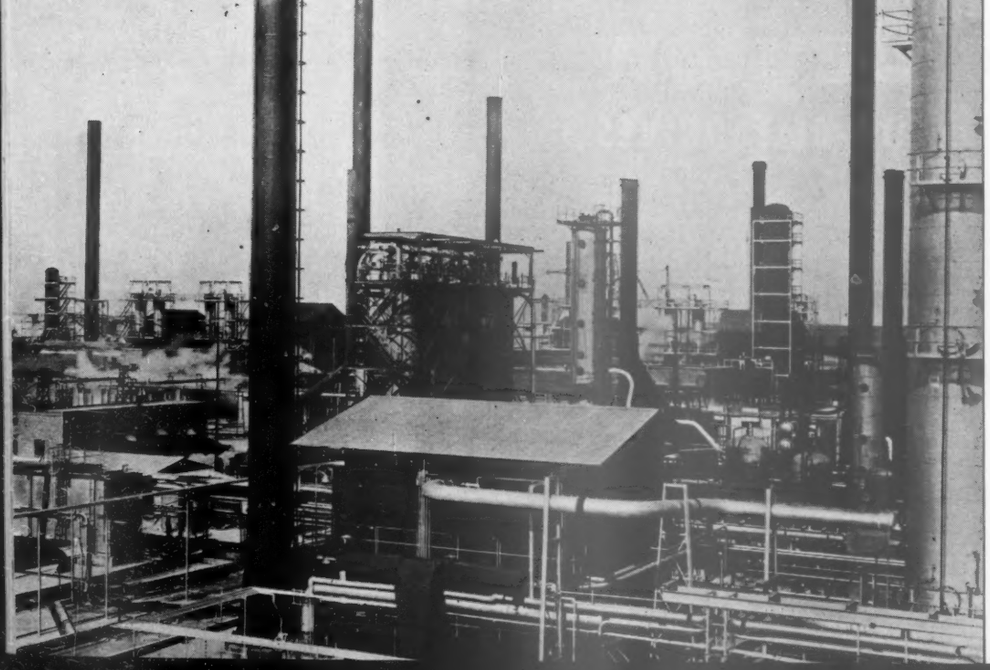
Straight distillation for commercial products gives a gasoline whose higher boiling constituents are of too low octane number for inclusion in present-day No. 1 motor spirit and therefore require re-forming, kerosene containing 20 per cent of aromatics, a gas oil of high cetane number, which is unusually good fuel for high-speed Diesel engines, and a fuel oil residue of low sulfur content.

These facts are responsible for the refining scheme operated in Abadan. The crude oil is distilled in three stages. In the first stage, it is preheated to 350° F. and injected into a fractionating column working at 50 pounds per square inch, the overhead from which, representing 8 to 10 per cent of the crude, has an endpoint of 100° C. and, after stabilizing and sweetening, is ready for incorporation in motor spirit.

The topped crude from the 50-pound tower is then submitted to ordinary pipe-heater and tower distillation at atmospheric pressure. The overhead from the column, a spirit of about 140° C. endpoint, is the highest boiling straightrun fraction used in motor spirit blends, and the first side stream, amounting to about 25 per cent of the crude, is the charging stock for the reforming units that produce the bulk of the motor spirit output. Kerosene and gas oil are obtained as lower tray cuts, and the residue from the atmospheric stage (45 per cent on the crude) is the main constituent of Abadan's furnace oil output. A portion of this residue, however, goes on to the third, or vacuum, stage of the distillation process, which produces a further quantity of straightrun gas oil and a heavy cut containing the bulk of the wax, leaving as residue a pitch amounting to about 12 per cent on the crude. The waxy cut is used as cracking stock, and the greater part of the pitch is incorporated in the furnace oil output of the refinery, together with the cracked gas oil and cracked heavy residue produced from the wax cut and from naphtha reforming. Since the cracked products are wax-free and the extra asphalt in the pitch is an effective inhibitor of wax deposition, the final furnace oil blend has a pour point much lower than that of the corresponding straight residue fuel oil.

The 12 per cent pitch is not all used as a fuel oil constituent, a portion of it being reduced further and blown to produce road asphalts and cut-backs of various specifications.

Catalytic polymerization plant at Abadan. In the background portions of the viscosity-breaking units may be seen.



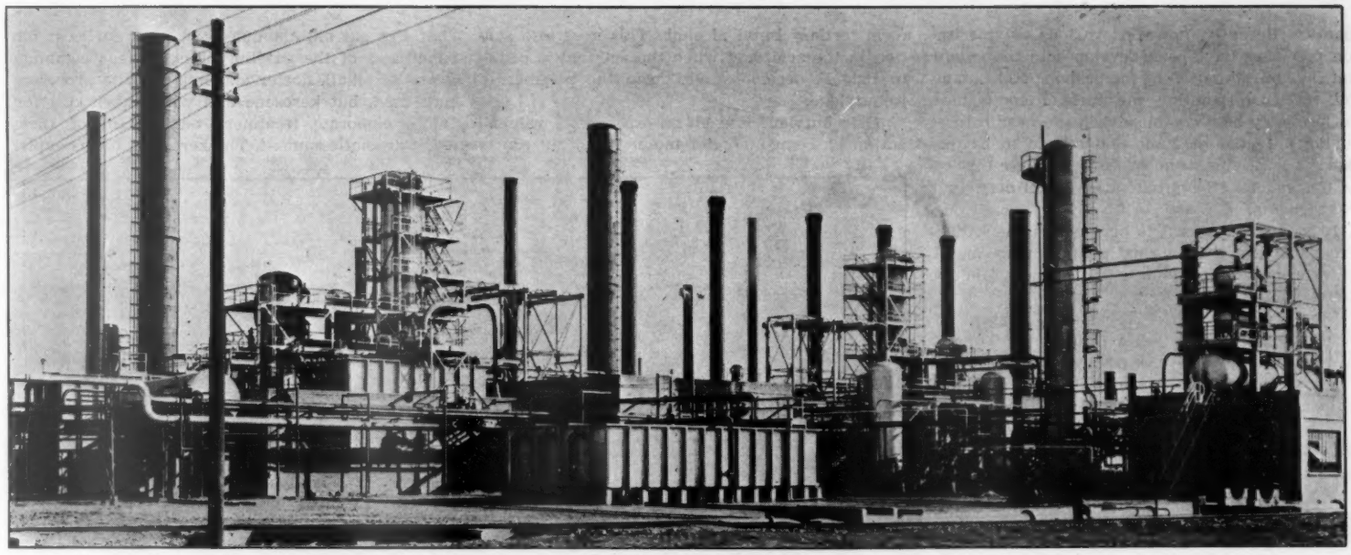
Distillation Equipment

Although there is still in use a quantity of shell-still equipment and several pipe-heater units operating only at atmospheric pressure, with a combined capacity of 60,000 bbls. per day, the bulk of the oil treated in Abadan refinery is handled through seven modern pipe-heater and column units. Three of these, with a combined capacity of 80,000 bbls. per day, provide for the high-pressure and atmospheric stages only, and one is an independent vacuum stage for handling 24,000 bbls. per day of the atmospheric residue they produce.

Of the remaining three units, one provides for the complete three-stage distillation of 28,000 bbls. per day of crude. The other two, which are of almost identical design, are believed to be the largest in existence. Each has a capacity of 75,000 bbls. per day of crude oil, but the vacuum stages can each handle only about 15,000 bbls. per day, i.e., rather less than half of the residue from the atmospheric stage. In the design of these units, full advantage has been taken of every opportunity that up-to-date instrumentation provides to facilitate the work of the operating staff. All important controls, including the largest valves, are power-operated from the instrument board in the control room. The firing of the furnaces is fully automatic, constant transfer line temperature being maintained independent of throughput fluctuations, and automatic control of reflux by tower-head temperature insures constancy in the volatility of the products.

Cracking

Cracking in Abadan dates from 1931, and at that time its principal function was the viscosity breaking of fuel oil. Four viscosity breaking units,



Two 12,000-bbl. naphtha reforming units in Abadan refinery of Anglo-Iranian Oil Co., Ltd.

each of 10,000 bbls. capacity, were installed, together with all the necessary ancillary equipment, such as gasoline absorbers, P.D. stabilizers, and rerun units.

Later, with the rise of octane number demanded by the gasoline market, light distillate re-forming became a major operation, and, with the installation of the vacuum distillation equipment mentioned above, viscosity breaking of fuel oil gave way to cracking of the wax-bearing fractions, as mentioned above.

Use for Reforming

In consequence, the original viscosity breaking equipment has been adapted in part for reforming and in part for waxy distillate cracking, and four new 12,000-bbl. re-forming units have been built. These last are arranged in two pairs, each pair around a central control house. Each consists of a double radiant section furnace, together with integral stabilizing and fuel flashing equipment. Particular care was exercised in deciding on the design of the furnace to insure that maximum flexibility for high-octane number production from naphthas of varying endpoints was achieved. When operating normally with the transfer line at 800 pounds per square inch and 1,025° F., these units produce 72 per cent by volume on the naphtha charged of 72-octane number pressure distillate.

However, 72-octane is not good enough for present-day motor spirit requirements, and, during the last two years, extensive experimental work has been carried out on the production of P.D. of higher octane number. This could, of course, be accomplished by raising the temperature and pressure but only at the expense of reduced throughput and yield and greater wear and tear of plant, and much more satisfactory results have been attained by recycling to the reformers the overhead from the P.D. stabilizers. An independent pump is used for this recycling in order to obviate the loss of light ends that would result from reducing the pressure of the stabilizer overhead to that on the suction of the main naphtha charging pump. The introduction of preformed gas with the charging stock reduces, in accordance with the law of mass action, the amount of new gas formed to produce equilibrium at the soaking temperature, and increases the yield of liquid products. The input capacity of the plant is somewhat reduced, but without increasing temperatures and pressures the octane number is raised to 75, and the percentage yield of P.D. on naphtha input is slightly increased.

At the present time, two new reforming units, each for 20,000 bbls. per day, are under construction.

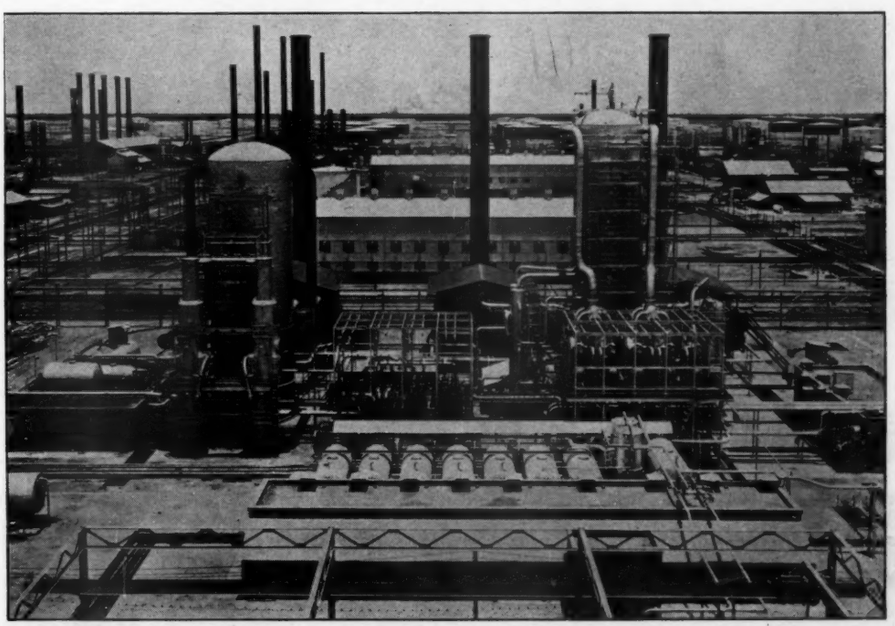
Refining of Pressure Distillate

Pressure distillate is acid-washed, redistilled to a low residue, and finally sweetened by hypochlorite before blending with other light spirit fractions to form products for marketing. Both acid and hypochlorite treatments are carried out in equipment in which the circulation of the liquids being contacted is maintained by the difference in density between the oil-reagent mixture produced by stirring in an agitating vessel, and the separate liquids in a separate vessel, the two vessels being cross-connected by short pipes at the bottom and approximately half way up. A complete acid treating unit consists of eight pairs of agitating and separating vessels. Five are devoted to counter-current acid washing, the sixth gives a neutralizing water wash, and the seventh and eighth a final soda wash. Using plant of this type, remarkable efficiency is obtained, particularly with acid treatment. The consumption of acid in Abadan P.D. refining is less than one-fifth per cent which means that the actual reagent in contact with the distillate is in effect acid tar. Polymerization loss is very low.

For the redistillation of P.D., five units are provided, each having a daily capacity of 14,000 bbls. of P.D. which is taken down to a 5 per cent residue. In three of the units, a pipe still and column of normal design are used to take the distillate down to a 20 per cent residue, which is further reduced to two steam-heated vacuum stages, open steam being used in the last stage. The two newest P.D. redistillation units work on the same three-stage plan, but all three stages are steam heated.

Gas Utilization

The utilization of the large quantities of gas produced with crude oil is a problem that has been the subject of intensive study by A.I.O.C. technicians for a long time. Although gas firing is standard practice on refining and power plant furnaces, there is a very large surplus, and the great distances separating the company's area of operations from any large centers of industry or population preclude the economic sale of gas in



A 28,000-bbl. topping and reducing unit. Behind the towers may be seen two buildings which house Holley-Mott washing units

quantity. Recently, however, various polymerization processes have been developed to the extent that the conversion of all the propane and butane and the corresponding unsaturated compounds will probably be accomplished in the near future, leaving only the methane and ethane to be disposed of locally, and the quantity of these carried by the crude oil approximates to refinery fuel requirements.

In general, by "gas" is here meant the hydrocarbons lighter than normal pentane that cannot be incorporated in motor spirit without unduly raising the vapor pressure.

The overhead from the pressure columns of the crude distillation units consists, of course, only of saturated hydrocarbons, ranging from ethane to pentane, with some H_2S. The mixture is refractionated under pressure in steam-heated columns into three fractions and a residue. The lightest fraction, consisting of ethane and H_2S. is used as works fuel. The middle fraction consists substantially of propane and butane, and a part of it is again fractionated to obtain almost pure butane, for which there is a certain demand as "bottled gas," but the bulk of this fraction is passed to a thermal polymerization unit for conversion into a highly aromatic "near-benzole," of which 5,000 bbls. per day are produced.

The heaviest of the three fractions is also refractionated to remove the lightest component, isopentane, which, on account of its very high octane number, is a very valuable constituent of aviation spirit. The residue, consisting of pentane and higher hydrocarbons, is blended into motor spirit.

Cracking Plant Gas

The gas resulting from cracking operations is obtained in two distinct streams. The first is from the high-pressure separators on the cracking units and consists almost entirely of ethane, methane and hydrogen. Part of it is used as a source of hydrogen for the hydrogenation plant mentioned below, and the remainder used as works fuel. The second stream, the overhead from the P.D. stabilizers, contains both paraffins and olefins with from two to four carbon atoms. It is collected under pressure and redistilled into a C_1 fraction and a C_2 and C_3 fraction. The C_4 fraction, containing all the isomers of butane and butylene, is agitated with cold 55 per cent sulfuric acid, which reacts selectively with the isobutylene to form tertiary butyl alcohol. This goes into solution in the acid, and when the solution is heated to 180° F. decomposes to form the polymer di-isobutylene.

Di-isobutylene is itself an exceedingly valuable antiknock component for motor fuels, but can be converted by hydrogenation into the still more valuable iso-octane, and a plant for carrying out this operation is now being commissioned in Abadan. A methane-hydrogen mixture obtained from the cracking plant separator gas is mixed with steam and subjected to a series of catalytic operations that result in the production of pure hydrogen, which, under the influence of another catalyst, reduces the di-isobutylene to iso-octane.

The butane and normal butylenes, which pass through the acid polymerization plant unchanged, are blended back with the C_3C_4 fraction of the cracked gases for treatment in a catalytic polymerization plant which turns out a mixed polymer spirit of high octane number.

Chemical Treatments

All the distillate products require a more or less elaborate refining treatment before marketing. For gas oil, a simple soda wash suffices; for distillates of the gasoline class, various combinations of alkali, doctor and hypochlorite processes are used, but kerosene and white spirit call for more elaborate treatment on account of their high aromatic content. The kerosene, for example, contains, as mentioned above, some 20 per cent of aromatics.

Since aromatics impair the clean-burning qualities of a kerosene, it is desirable to remove them from this product and to incorporate them in the motor spirit, on which they confer valuable antiknock properties. The transfer is effected by extraction with liquid sulfur dioxide, which at low temperatures (about 14° F.) has a powerful solvent action on aromatics while remaining inert to most aliphatic hydrocarbons.

The kerosene produced in Abadan is therefore subjected to SO_2 extraction in two plants having a combined capacity of 20,000 bbls. of kerosene per day. In these plants the kerosene and SO_2, after cooling to the required temperature, are contacted in countercurrent fashion in packed towers. The SO_2, containing in solution the aromatics extracted from the kerosene, and the undissolved part of the kerosene, which itself has dissolved some SO_2, are then redistilled for the recovery of SO_2, which is returned to the process, leaving behind an aromatic-free refined kerosene and an aromatic extract. About 57 per cent of the extract boils within the motor spirit range and is distilled off in a battery of stills reserved for this purpose, leaving a residue which distills within the gas oil range, and is therefore transferred to that product.

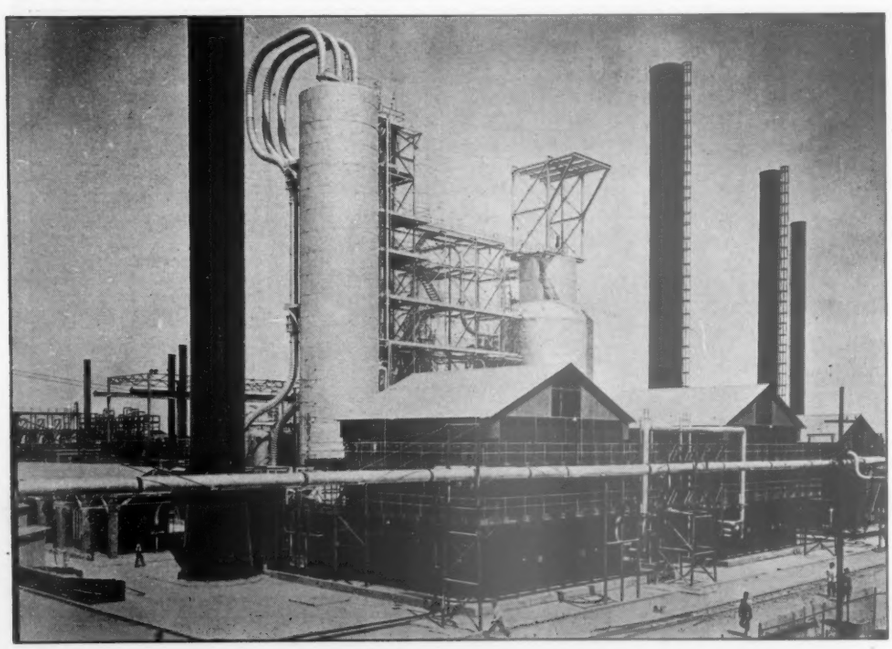
An interesting point about the aromatic extract from Iranian kerosene and white spirit is that it is not only high in antiknock value, but is also an effective inhibitor of gum formation in cracked spirit.

Power Services

In any oil refinery, trustworthy power and water supplies are, of course, no less important than the refining plant proper, and in a plant as large as Abadan, completely isolated from all industrial centers, their provision is a large undertaking.

The average electrical load, for instance, is over 12,000 kilowatts, and the present installed capacity of the power station is 18,000 k.v.a. there being two turbo-alternators of 4,000 k.v.a. and two of 6,000 k.v.a. Power is generated at 3,300 volts 3-phase 50-cycles and transmitted by overhead and underground lines to a number of substations conveniently located for serving all

One of Anglo-Iranian Oil Co.'s 12,000-ton tankers loading at the Bawarda installation



One of three 75,000-bbl. three-stage distillation units

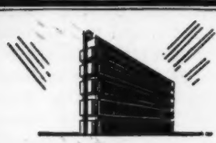
FLUOR

FROM PLAN TO PLANT . . . BE SURE WITH FLUOR

FOR 20 years we have successfully designed, engineered and constructed plants and projects for the oil, gas and allied industries, the world over. ☆ In the building of each and every one of these plants, of which the one above is characteristic, The Fluor Corporation, Limited, has assumed *undivided responsibility* for every detail. ☆ Be sure with Fluor. Begin today by writing for a brochure which pictorially describes Fluor's complete designing, engineering and construction service.

THE FLUOR CORPORATION, LTD.
909 East 59th Street Los Angeles, California

703 Fairfax Bldg., Kansas City, Missouri • 719 McBirney Bldg., Tulsa, Oklahoma • 601 Second National Bank Bldg., Houston, Texas • P. O. Box 2221, Phoenix, Arizona • 30 Rockefeller Plaza, New York City, New York • London, England



Fluor also designs, manufactures and constructs the most complete line of Atmospheric Aerator-type Cooling Towers, Forced and Induced Draft Cooling Towers; Gas Cleaners; and Air-cooled Mufflers, for large oil and gas engines.

FLUOR · DESIGNERS · ENGINEERS · CONSTRUCTORS

parts of the refinery, local distribution being at 3,300 volts 3-phase for large motors, 440 volts 3-phase for small motors, and 250 volts single-phase for lighting.

In order to take care of the power requirements of the plant extensions now in hand, and to cater for the ever-increasing nonindustrial load provided by the residential areas of Abadan, the installed capacity of the power station is being increased to 65,000 k.v.a. by the addition of two 22,500 k.v.a. sets.

Water

All the water used in Abadan for process purposes (mainly condenser and cooler water) is pumped from the Shatt-al-Arab at the upper end of the refinery foreshore and eventually returns through a network of underground piping and large concrete culverts discharging through oil separating ponds into an effluent channel that rejoins the river half a mile lower down. The water pumping station is of particular interest.

The pumping sets, five in number, are the most powerful yet constructed of their type. All are single geared turbine centrifugal pumps and deliver against a pressure of 65 pounds per square inch. Three of them, each having a capacity of 2,000,000 gallons per hour, have twin impellers with suction branches at both ends of the casing; the other two (4,000,000 gallons per hour each) consist each of two separate single impeller pumps mounted in tandem.

The total capacity of the five pumping sets (which are, of course, not all used simultaneously) is greater than the average rate at which water is distributed by the Metropolitan Water Board to London and the surrounding areas.

The five pumping sets are mounted 12 feet below ground level so as to insure flooded suctions at all states of the tide. Since the subsoil is saturated with water, the construction of the foundations, which are in effect a floating box of reinforced concrete, was a matter of considerable difficulty.

Steam

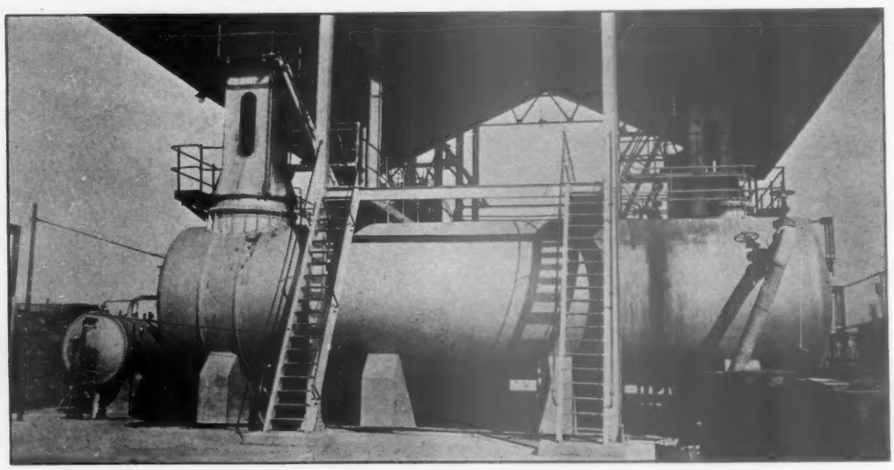
The power station and water pumps are steam driven, and since steam is also used on a large scale for process purposes and for driving pumps on the distillation and cracking units, the boiler plant is extensive.

The water pumps have their own boiler battery of four vertical tube boilers, each designed for 45,000 pounds of steam per hour at 220 pounds per square inch.

The power station and process units are supplied from two interconnected batteries of boilers, one being situated at the power station and the other in the neighborhood of the cracking units. The power station battery includes eight water tube boilers of 25,000 pounds per hour capacity, four of 40,000 pounds per hour and four of 150,000 pounds per hour, and the cracking plant battery 10 of 45,000 pounds per hour and two of 150,000 pounds per hour. The 150,000-pound boilers are of the bent tube type with water wells and have been adopted as standard for future extensions.

Oil Storage and Shipment

When Abadan was first established, the whole of the storage tanks were situated on the desert behind the refinery, through which the loading lines passed to loading jetties on the foreshore. Later it became apparent that the jetties that could be accommodated in front of the refinery site would not suffice for the growing exports of oil, and a new tank farm and loading installation were begun in 1919 at Bawarda, 3 miles down the river and beyond the town of Abadan, which had sprung up in consequence of the establishment of the refinery. The storage and loading of crude oil and low-flash products was transferred to Bawarda, while fuel oils and the like were still handled at Abadan.



Mixing vessels of the isobutylene polymerization using the cold acid process

During the last year or two, it has become apparent that the tonnage exported has almost reached the practical maximum. This is fixed by the number of jetties for which there is room on the Abadan and Bawarda foreshores and by the existence in the river some 12 miles below Abadan of a hard bar that can be crossed by fully loaded ships only for some hours before and after high water.

In order to increase the export capacity from Abadan, therefore, a new loading installation is being built at Khosrowabad, below the bar and some 18 miles from Abadan. Initially the new installation will be devoted to the shipment of residual oils only, since the small number of grades prepared and their general similarity to one another reduce the amount of tankage required and make it possible to batch the various grades through a single pipe line from Abadan.

The pipe line, 20 miles long, will be 12 inches in diameter, and will be served by two electrically driven centrifugal pumps, one normally in use and the other a standby. The pumps have been designed to deliver 1,200 gallons per minute at 600 pounds per square inch, this being the pressure required for the most viscous oil likely to be encountered; but their characteristics are such as to make them equally suitable for delivering a larger quantity of a less viscous fluid to the same pipe line system.

Thirty main storage tanks, each of 125,000 bbls. capacity, are being erected; they will be divided into a furnace oil group and a Diesel oil group, and provision is being made for subsequent further subgrouping when this becomes necessary.

Capacity of Pumps

With each group of tanks is associated a loading pump house containing three pumps, each capable of delivering 700 tons per hour at 400-foot total head, this being the estimated head required when using two pumps in parallel for loading a ship through the 12-inch lines from the pump house to the jetties. The suction lines between tanks and pumps will be 20 inches in diameter.

All the pumps will be electrically driven, and the necessary power will be supplied from the Abadan power station through a high-tension overhead transmission line.

In the first stage of development of the Khosrowabad installation two loading berths will be provided, but provision is being made for additional jetties, and land has been reserved for the erection of further storage tanks and loading pump houses when these become necessary.

Two S.O.N.J. Tankers Added In Defense Program

Two high-speed, national-defense featured tankers were launched recently for Standard Oil Co. of New Jersey. The first took the water at Kearny, N. J., and the second slid down the ways at Chester, Pa. The Markay and Seakay, 553 feet in length and 75 feet broad, are, respectively, the second and third vessles in a program of 12 such tankers contracted for by an agreement between Standard Oil Co. of New Jersey and the U. S. Maritime Commission under which the oil company agreed to an expenditure of $26,993,004 for the vessels, while the Government defrayed the additional cost of $10,563;000 for the special national-defense features to be incorporated in the 12 ships.

The first of this series, the Cimarron, was launched from the Sun Shipbuilding yard in January. She attained an average speed of 19.28 knots during the trial runs, and on the best run reached 19.48 knots. She has a radius of action of about 12,000 miles.

While the high speed of these new tankers will be their primary national-defense characteristics, they will boast additional features especially designed and installed for their use as auxiliaries to the navy. These include magazine spaces, gun foundations, gear for fueling at sea, paravane installations at the stem, navy searchlights, etc. Their capacity is approximately 147,-150 bbls.

Calgary Refinery to Be Ready for Operation in May

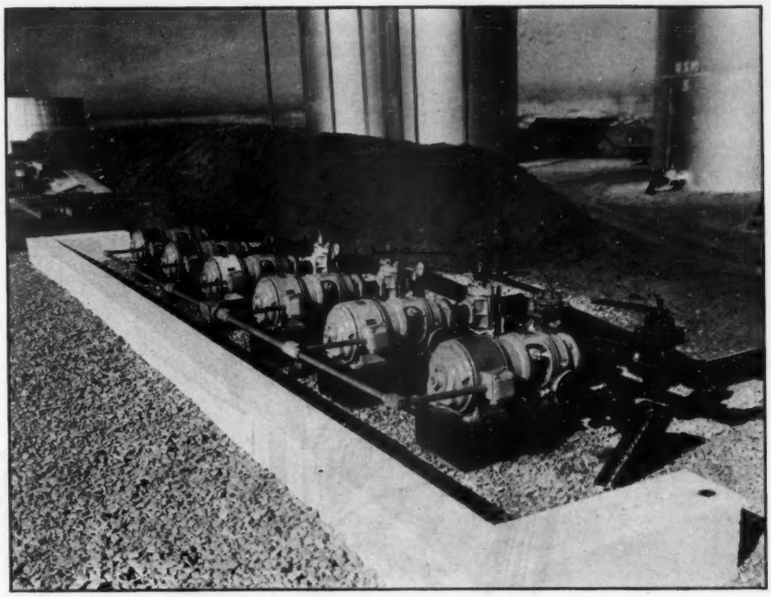
CALGARY, Alberta.—Rapid progress is being made with construction work on the new British American Oil Co. refinery in East Calgary. The plant, expected to be ready for operation in May, will be complete with topping and cracking units, treating plant and finishing still, with around 4,500 bbls. daily capacity. Storage capacity will be around 500,000 bbls. Turner Valley crude will be processed, and the initial output will include gasoline, kerosene, tractor, Diesel, domestic and industrial fuel oil and road oil.

Turner Valley Refinery Will Be Enlarged

CALGARY, Alberta.—Gas & Oil Products, Ltd., operating a gasoline absorption and refining plant on the Mercury tract in South Turner Valley, is preparing to install a Dubbs cracking unit and an auxiliary copper sweetening and ethylizing plant which will increase the run from 2,000 to 3,000 bbls. a day. Doctor Born, of the Born Engineering Co., of Tulsa, will supervise installation which will be completed by July.

Unique Bell Oil Terminal

By D. H. STORMONT



Weather-proof pumping units used for loading and blending

Bell Oil & Gas Co. recently placed in operation a new gasoline loading terminal 6 miles west of Burkburnett, Tex., that is featured by its automatic operation and ease with which loading is accomplished. The loading plant, located on a hard-surfaced all-weather highway, is the southern terminus of a 10-mile, 4-inch line running from the company's refinery at Grandfield, Okla. Primary reason for the terminal and for the line, which was laid at the same time, was to provide the company with a more accessible outlet to its southern markets.

All shipments from the refinery to the terminal are made at night, four different grades of gasoline and kerosene and distillate being handled. At first it was planned to pump slugs of water between different products, to prevent intermixing, but experiments proved that this was not necessary. However, to make certain there was no mixing a control house was placed up the line a short distance from the terminal. Continuous samples are taken during the line's operation and checked for gravity, color and flashpoint. As soon as a "break" occurs in the product's specification, the change in specification happening almost instantaneous, it is possible to calculate in how many seconds the receiving tank should be switched. This is done through knowing the line's capacity, the rate of transfer and the exact distance from the control house to the header valve on each of the receiving tanks. As soon as the computed time has elapsed after the break, the stream is switched to the proper tank.

Meters placed on the refinery end of the line measure the amount of each product placed in the line, rate of transfer being 60 gallons per minute. The line is always kept filled with the product for which there is the greatest demand (regular-grade gasoline) so that there are never two products in the line when it is shut down.

Terminal storage consists of two 20,000-gallon tanks and seven 10,000-gallon tanks for handling gasoline, kerosene and distillate and one 15,000-gallon tank for storing natural gasoline. Ethyl gasoline is blended at the refinery and transferred to the terminal, but other grades of gasoline are brought to specification at the terminal, these other grades being third-grade, regular 71-octane gasoline and "Q" or house-brand gasolines. After the contents of each tank are brought to specification and have been checked by the refinery chemist, the tank is sealed. The chemist then issues affidavits as to the specifications of each tank's contents. To cut down the time in sampling and testing each tank, it is planned to install testing equipment at the terminal to make its operation almost independent of that of the refinery.

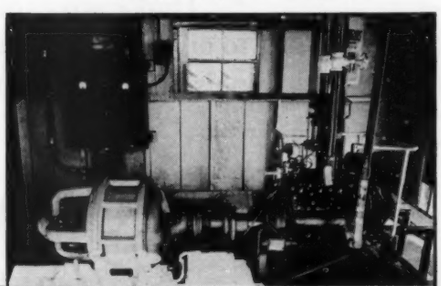
Six 2 hp., 220-volt polyphase motors are used for loading and blending. These are direct connected to centrifugal pumps of 200 gallons per minute capacity, operating at 3,490 r.p.m. The units are mounted in the terminal yard, since they are of weather-proof construction, and are controlled from the loading dock by explosion-proof switches. All lines from the tank to the pumps and from the pumps to dock are kept filled so that as soon as the dockman throws the switch, loading is started. Then as soon as the truck is filled the flow is cut off at the dock and the motor shut down, or if more trucks are to be loaded the motor is left running while the switch is being made. Connections at the dock allow four 1,000-gallon trucks to be loaded out in five minutes, or an average of one truck every one and one-quarter minutes.

To reduce the possibility of a wrong switch being thrown or a wrong valve being turned, colors have been adopted for each product and followed throughout. For example, for Ethyl gasoline a red stripe is painted on the loading dock connections, on the pumping unit and its connections, and on the storage tank itself the product is labeled in that color. For other products, different colors are used in a like manner.

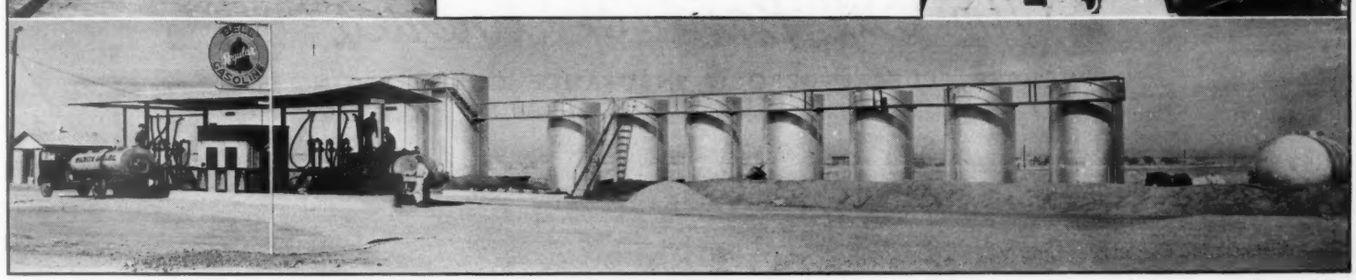
•Power for the loading pump motor, and for floodlighting the terminal at night, is supplied by a 15 k.v.a., 220-volt three-phase generator direct connected to a converted gasoline engine.

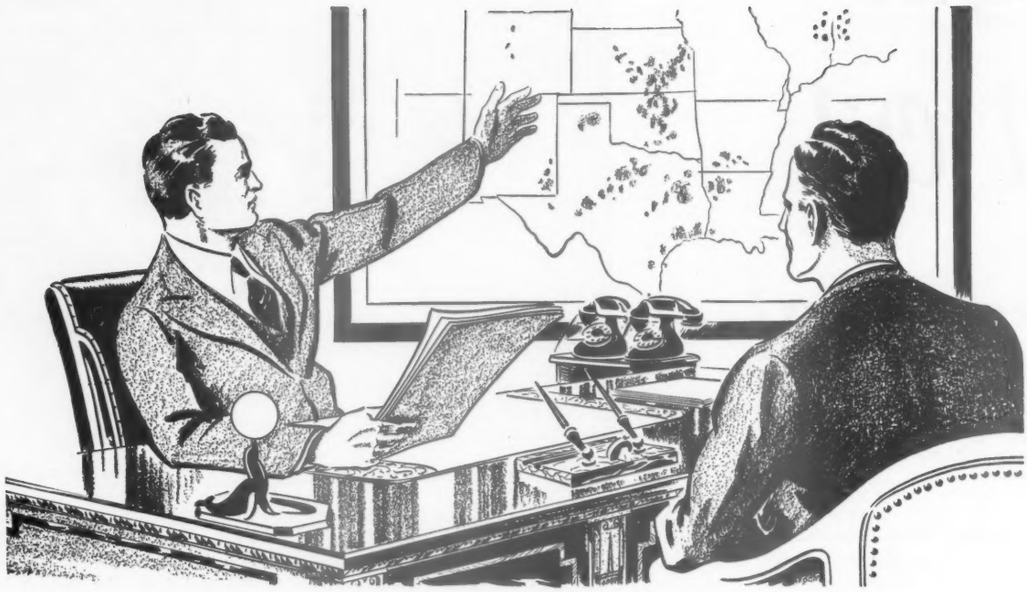
Loading dock at the company's new terminal west of Burkburnett, Tex.

Generating unit for loading pumps and floodlighting the yard at night



General view of Bell Oil & Gas Co.'s new loading terminal west of Burkburnett, Tex.





Serving Oil Men and Bankers Alike

Serving side by side with its correspondent banks, as well as with independent producers and operating companies, the National Bank of Tulsa is definitely associated with the great petroleum industry. Understanding its problems, financing its operations, serving its many banking needs, this bank can cooperate closely with the owners and management of the oil industry.

That's why this bank has long been "The Oil Bank of America" to oil men and bankers throughout the Mid-Continent field and in Illinois and Michigan; yes, in Kentucky, Indiana and Missouri, too.

NATIONAL BANK OF TULSA

The Oil Bank of America

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

(Continued from Page 96)

of the Sicromo 5M and 7M type steels is shown in Figure 8. From the values given it seems that the higher vanadium additions are not beneficial. It is possible, however, that through special heat-treatment better properties could be conferred to the higher vanadium steels.

The corrosion resistance of steels to hot petroleum products depends primarily upon the chromium content. An early relationship, developed

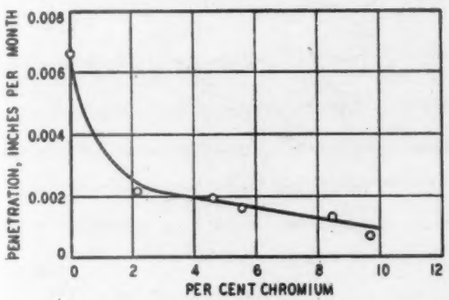


Figure 9

Relation existing between corrosion rate and chromium content when handling corrosive crudes at high temperature and pressure (Reproduced from E. S. Dixon's chapter in the Book of Stainless Steels, 2nd Edition, p. 584)

by Mr. Dixon, between corrosion resistance and chromium content is shown in Figure 9. Recent information obtained from actual cracking tube installations indicate a more straight-line relationship to exist than shown in Figure 9. This in turn implies that the improvement obtained with

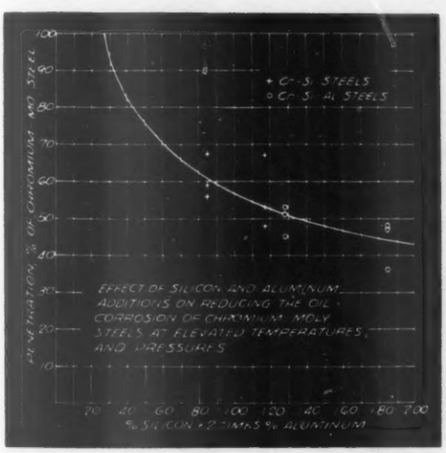

+ Cr-Si STEELS
○ Cr-Si-Al STEELS
EFFECT OF SILICON AND ALUMINUM ADDITIONS ON REDUCING THE OIL CORROSION OF CHROMIUM-MOLY STEELS AT ELEVATED TEMPERATURES AND PRESSURES
% SILICON + 2 TIMES % ALUMINUM

Figure 10

higher chromium additions is more pronounced than would appear from the figure. To what extent this may be due to changes in the type of crude, their more sour character, acid treatment of the wells, higher velocity of the oil stream, is difficult to ascertain. Regardless of the cause, the tendency at the present time in the selection of materials for severe corrosive conditions is towards chromium-molybdenum steels with a chromium content in excess of 6 per cent.

The effectiveness of chromium in imparting corrosion resistance can be further enhanced by the addition of silicon, or silicon plus aluminum, as shown in Figure 10. With a relatively small silicon or silicon plus aluminum addition the corrosion resistance of a plain chromium steel can be doubled. From this it follows that the most economical steel for resisting corrosion is obtained when advantage is taken of this beneficial influence of silicon or silicon plus aluminum, as is the case in the Sicromo and Alcrosil steels.

TABLE 1—CHEMICAL COMPOSITION

Type—	C.	Mn.	Si.	Cr.	Mo.	Relative cost 4-6% Cr.-Mo. steel = 1
Sicromo 5	.15 Max.	.50 Max.	.50/1.00	4.00/ 6.00	.45/ .65	1.00
Sicromo 5M	.15 Max.	.50 Max.	.50/1.00	4.00/ 6.00	.90/1.10	1.07
Sicromo 5S	.15 Max.	.50 Max.	1.00/2.00	4.00/ 6.00	.45/ .65	1.06
(Formerly Sicromo 5)						
Sicromo 5MS	.15 Max	.50 Max.	1.00/1.50	4.00/ 6.00	.90/1.10	1.12
Sicromo 7	.15 Max.	.50 Max.	.50/1.00	6.00/ 8.00	.45/ .65	1.11
Sicromo 7M	.15 Max.	.50 Max.	.50/1.00	6.00/ 8.00	.90/1.10	1.16
Sicromo 7S	.15 Max.	.50 Max.	1.00/1.50	6.00/ 8.00	.45/ .65	1.14
Sicromo 7MS	.15 Max.	.50 Max.	1.00/1.50	6.00/ 8.00	.90/1.10	1.18
Sicromo 9	.15 Max.	.50 Max.	.50/1.00	8.00/10.00	.45/ .65	1.50
Sicromo 9M	.15 Max.	.50 Max.	.50/1.00	8.00/10.00	.90/1.10	1.62

Sulfur and phosphorus each 0.030 per cent maximum.

TABLE 2—RUPTURE STRENGTH OF SICROMO STEELS AT 1,200° F. AND 1,300° F.

Steel designation—	Short-time tensile strength	Stress in pounds per square inch for fracture in designated time period, hours				
		10	100	1,000	10,000	100,000
Testing temperature, 1,200° F.:						
Sicromo 5S	24,000	12,250	8,700	6,200	4,400	3,150
Sicromo 5MS	29,900	14,250	10,200	7,400	5,400	3,950
Sicromo 7	29,250	14,500	10,200	7,400	5,300	3,700
Sicromo 7M	34,250	17,000	11,900	8,200	....	....
Sicromo 7S	28,000	14,000	10,200	7,800	....	....
Sicromo 7MS	34,500	16,000	11,500	8,200	5,900	4,300
4-6 per cent Cr-Mo	25,800	12,800	9,500	7,200	4,700	3,000
Testing temperature, 1,300°F.:						
Sicromo 5S	15,000	7,500	5,250	3,700	2,650	1,850
Sicromo 5MS	19,000	8,000	5,800	4,250	3,100	2,250
Sicromo 7	21,000	9,000	6,000	4,000	2,700	1,800
Sicromo 7MS	21,600	9,400	6,300	3,900	2,550	1,700
4-6 per cent Cr-Mo	19,000	8,600	6,000	3,600	2,200	1,300

Note: These tests conducted under slightly oxidizing conditions. Under more severely oxidizing or corrosive conditions the higher silicon steels would show to even greater advantage.

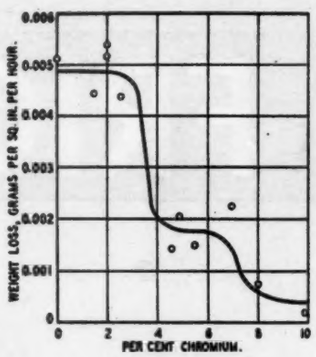


Figure 11

Effect of chromium content upon the oxidation resistance of steel heated for 120 hours in air at 1,300° F. While 10 per cent chromium is required to obtain commercial nonscaling properties at this temperature, the use of from 4 per cent to 7 per cent chromium will greatly improve oxidation resistance. (Die Korrosion Metallischer Werkstoffe, Vol. I, 1936)

Oxidation Resistance

Chromium not only increases the corrosion resistance of the steels to which it is added but also exerts a pronounced improvement in the prevention of scaling. The general effect of chromium content on the nonscaling properties of

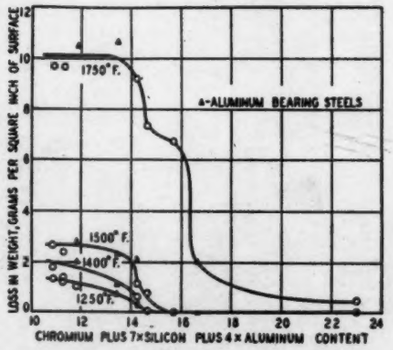


Figure 12

Total effect of chromium, silicon and aluminum on the oxidation resistance of steels after 1,000 hours heating in air. Note that silicon appears to be seven times, and aluminum four times, as effective as chromium in chromium-bearing steels. With 1.5 per cent Si and 5.0 per cent Cr the steels may be considered as commercially nonscaling up to 1,500° F.

steel at 1,300° F. is shown in Figure 11. In these tests the specimens were heated in air for 120 hours. A decided improvement results upon the

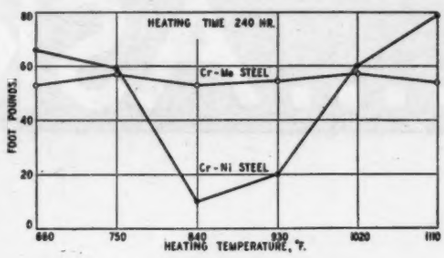


Figure 14

addition of 4 per cent chromium but an amount of about 10 per cent is required to produce a commercially nonscaling steel at this temperature.

It has already been shown how silicon and aluminum additions improve the corrosion resistance in hot petroleum products. A similar effect,

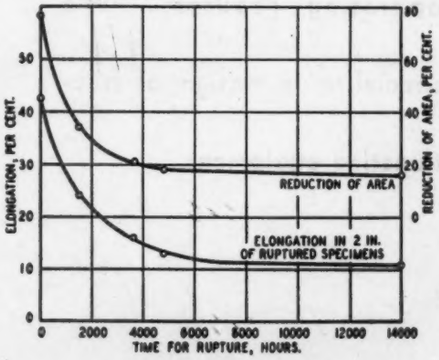
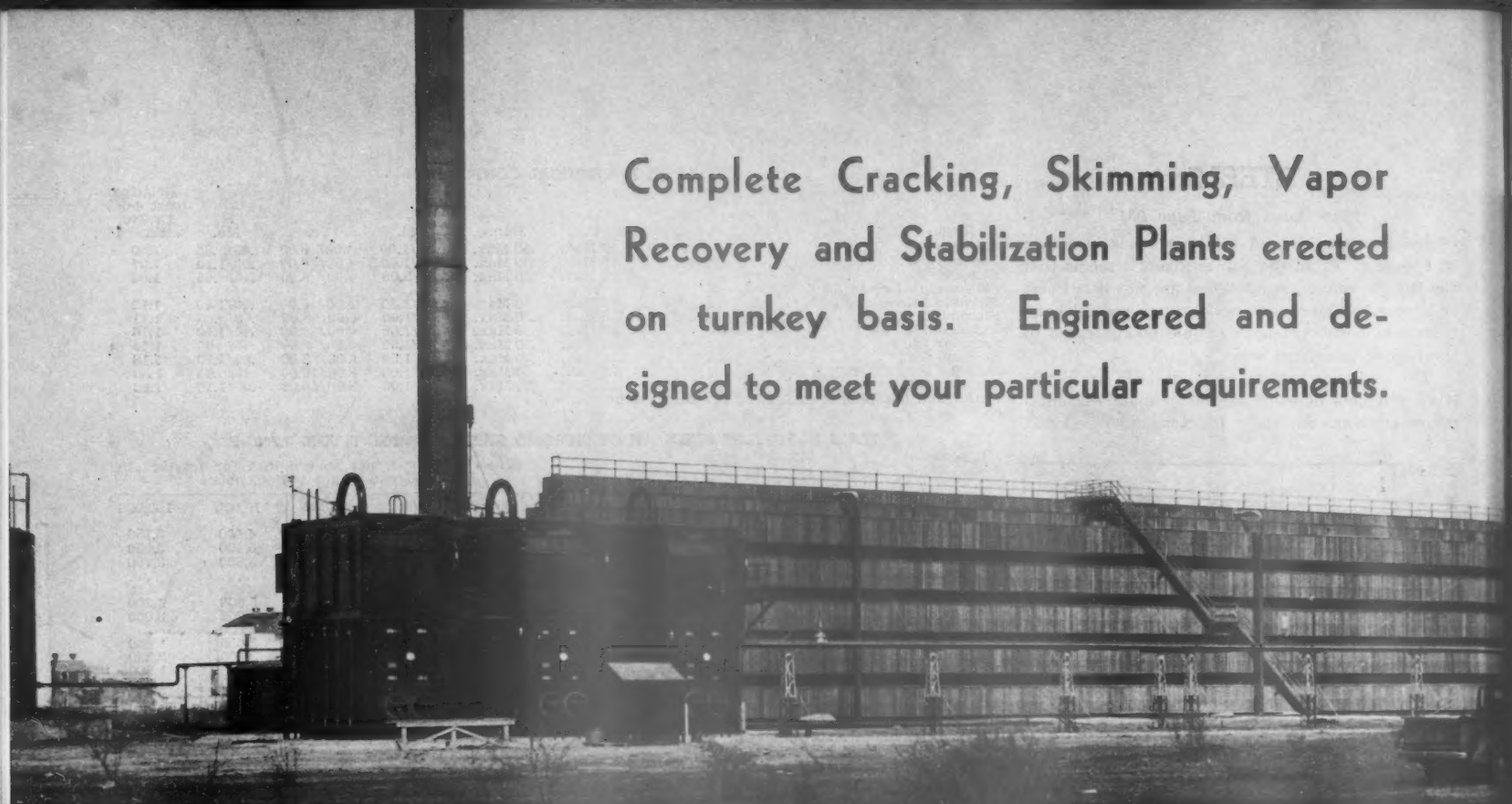


Figure 15

Effect of structural or surface instability as shown by time required to rupture S.A.E. 1015 carbon steel held at 1,000° F. Note that good initial ductility at room temperatures does not necessarily assure satisfactory toughness after prolonged heating

only to a much larger degree, is obtained in the oxidation resistance through the use of these same two elements. This is shown in Figure 12. It may be observed that in chromium bearing steels, silicon is seven times, and aluminum four times, as effective as chromium in imparting nonscaling characteristics in oxidizing atmospheres. In fact

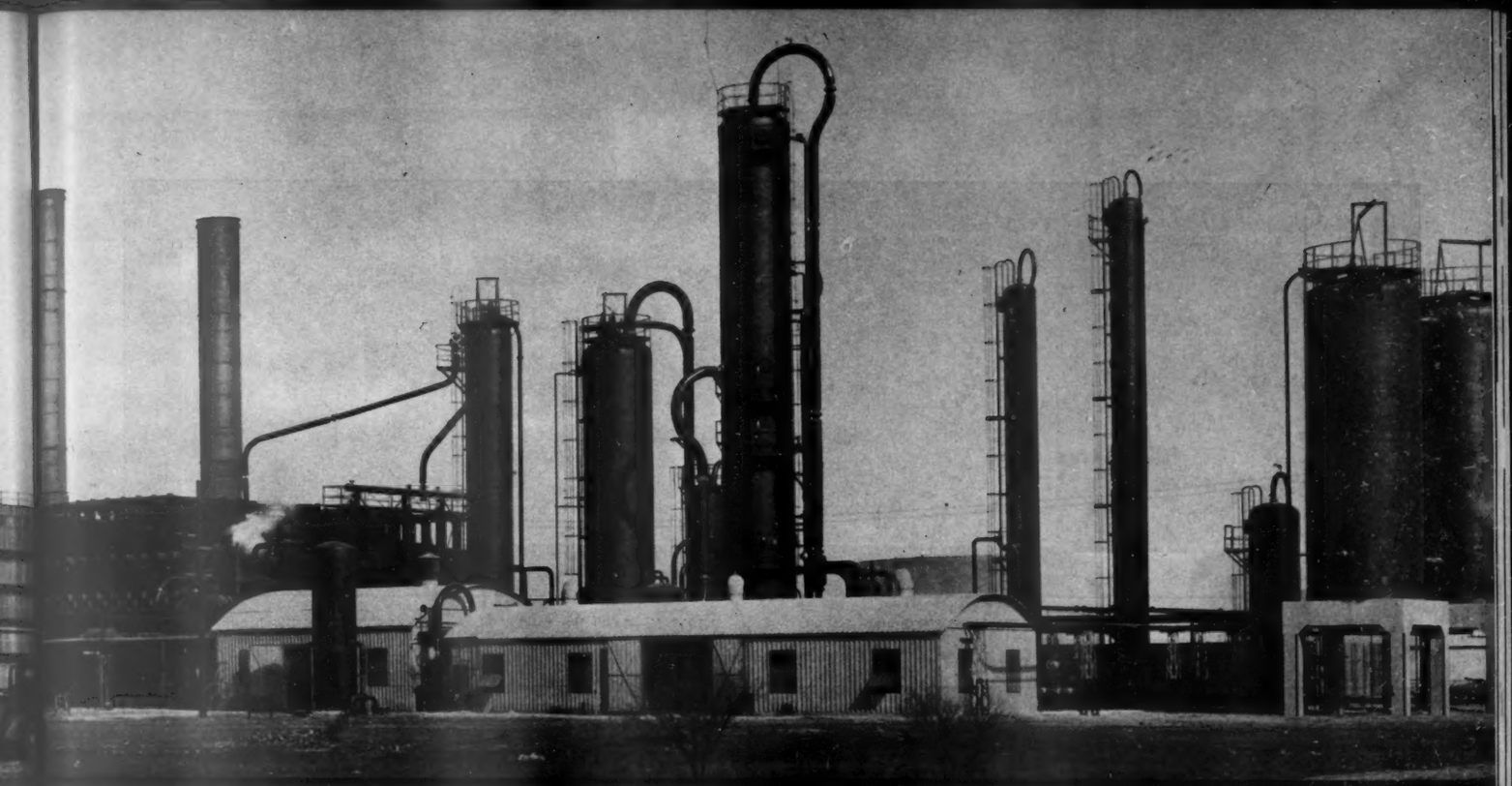
(Continued on Page 132)



Complete Cracking, Skimming, Vapor Recovery and Stabilization Plants erected on turnkey basis. Engineered and designed to meet your particular requirements.

.....ASK FRICK-REID A

We build complete gasoline plants designed for specific operating results. We specialize in design of fractionating equipment.

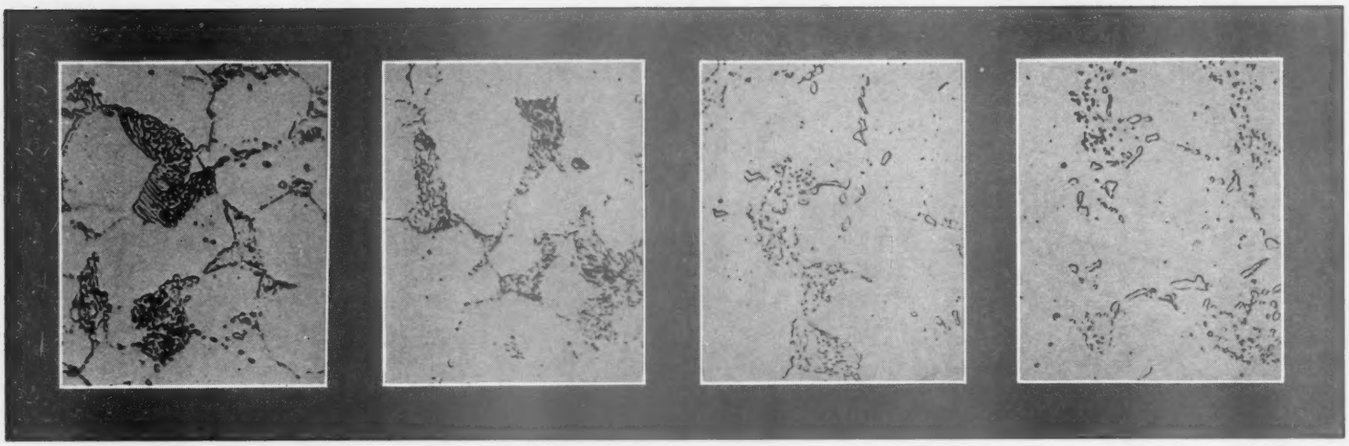


D ABOUT REFINERIES

Consultation with our experienced engineers cordially invited. Equipment and construction bids gladly submitted.

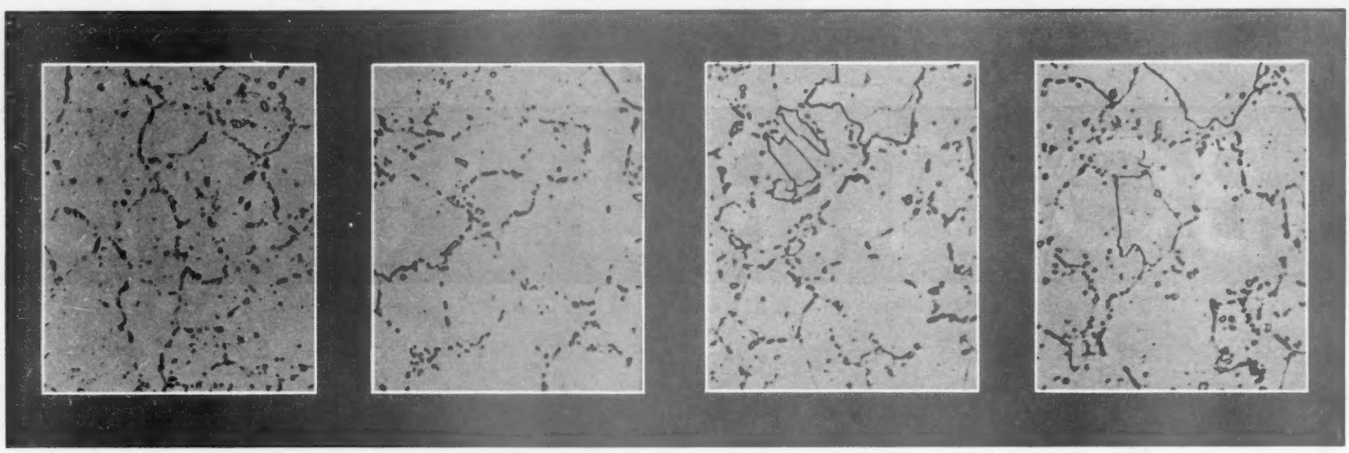
FRICK-REID

Supply Corporation



900° F.—1,300 hours—15,000 pounds | 1,000° F.—1,100 hours—10,000 pounds | 1,100° F.—1,000 hours—3,000 pounds | 1,200° F.—1,100 hours—3,000 pounds

Carbon-Molybdenum steels



900° F.—1,065 hours—12,500 pounds | 1,000° F.—1,020 hours—7,000 pounds | 1,100° F.—1,040 hours—4,000 pounds | 1,200° F.—1,000 hours—3,000 pounds

Sicromo 2 steel

Fig. 13—Influence of time, temperature and stress (creep tests) on the microstructures of two types of steels. (X 1,000)

a 5 Cr-Mo steel to which 1.5 per cent silicon has been added (Sicromo 5S) may be considered as commercially nonscaling at 1,500° F. in air.

The lack of structural stability is manifested

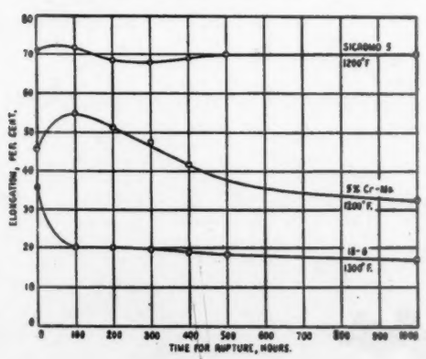


Figure 16

Comparison of ductility characteristics of Sicromo 5 steel and 5 per cent Cr-Mo steel at 1,200° F. for fracture times up to 1,000 hours. The greater stability of the high silicon steel is evident. The marked decrease in ductility values of 18-8 at 1,300° F. indicates carbide precipitation and intergranular oxidation

by certain changes in the crystal structure of the steel which may occur during service under temperature, stress and time. The most common of these changes is spheroidization in which the carbide constituent changes from its plate-like

(Continued on Page 136)

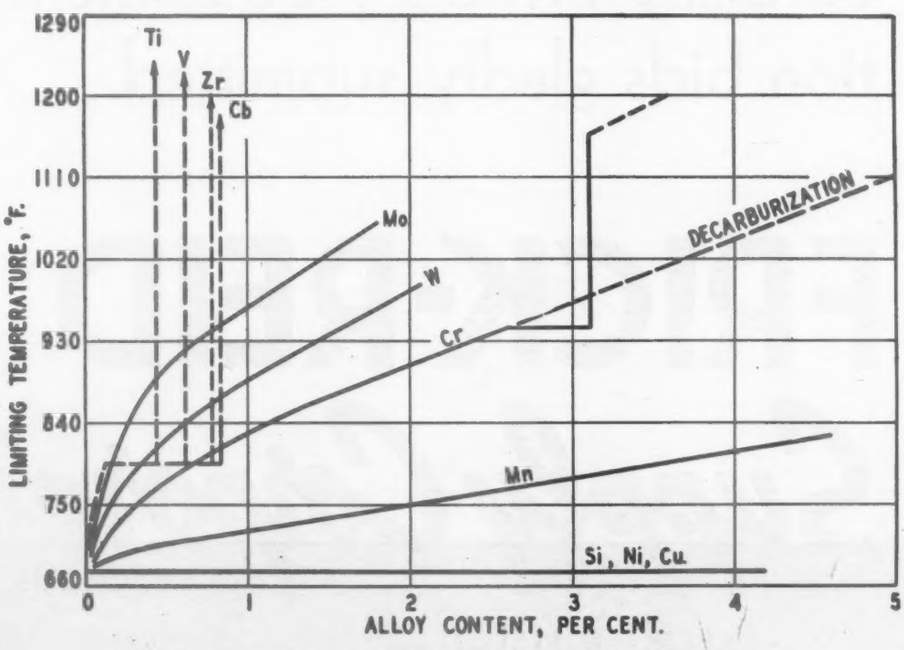
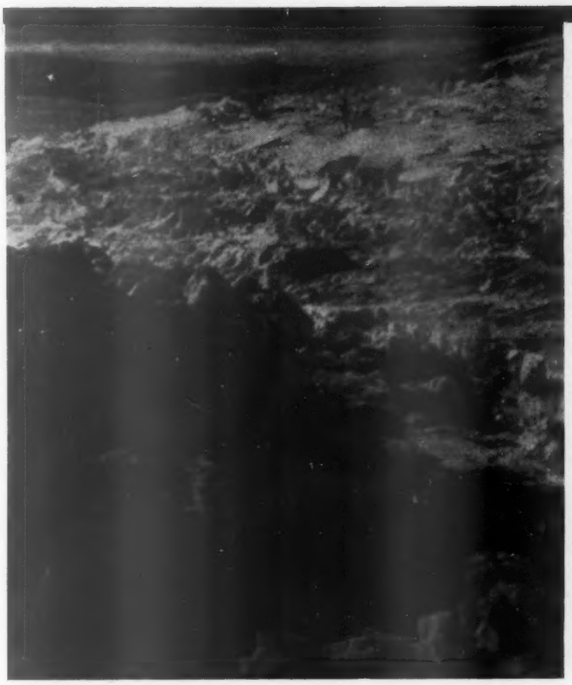
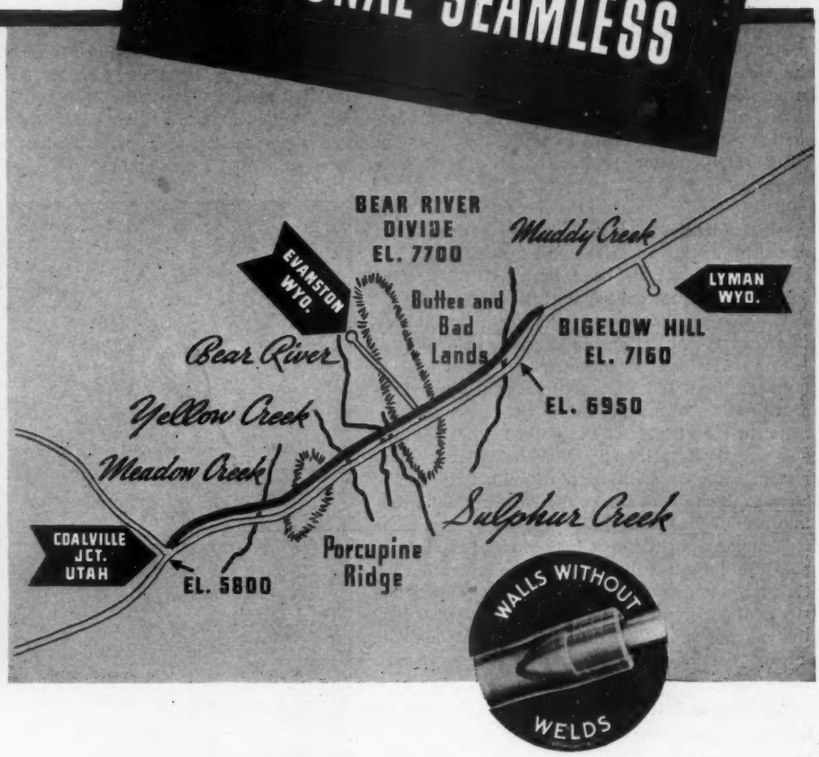


Figure 17

Porcupine Ridge

53 miles of 18 inch NATIONAL SEAMLESS





BIG news in the gas industry recently was the on-time completion of the 53-mile looping project in Wyoming and Utah. This new, all-NATIONAL Seamless line which parallels existing facilities, was designed as a supplemental line to carry additional gas during winter peak loads.

To serve during the current winter, this line had to be ready for service *on schedule*. And despite all the impeding forces which nature could muster, it was. This part of the country has long been known as a difficult area for construction projects. But to make matters worse, winter descended this year earlier than usual. By mid-November, snowfall had reached 10 inches. Temperatures plummeted to 16 degrees below zero. Earth promptly turned to "rock." Rivers sheathed themselves in 6 inches of ice. Idle equipment froze fast to the ground.

That this line was completed on schedule in the face of such overwhelming odds is a tribute to every man, every machine, and every length of pipe employed on the job. Weakness anywhere would almost certainly have spelled defeat.

For safe handling of the high pressures required in efficient gas transmission, NATIONAL Seamless has many times proved itself the safest, surest investment. It provides the extra margin of strength necessary to withstand unexpected pressure surges, ground settlement, and other unpredictable stresses—both during laying and in service.

NATIONAL Seamless means pierced from a solid billet of finest quality steel. It gives you greatest assurance of full wall strength, ample ductility for bending, and uniformly straight lengths.

The use of NATIONAL Seamless Pipe in this new line exemplifies today's trend in pipe line construction. Seamless takes the guesswork out of the pipe—puts dependability right in the specifications. Write for Bulletin No. 23.

NATIONAL TUBE COMPANY

PITTSBURGH, PA.

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

form into spheroids. This change will occur in all steels under prolonged time periods at temperatures above 1,000° F. and is accentuated by stress. It is generally assumed that the creep resistance is lowered by this change of structure. The annealing treatment given by the steel mill to the higher chromium steels produces a spheroidized structure which is the most stable condition. These two types of microstructures, together with their behavior under the combined influence of time, temperature and stress, are shown in Figure 13.

Critical change transformations, that is, the passage of the ferrite from the alpha to the gamma condition, can only occur in service under severe overheating. Since chromium, as well as silicon and aluminum, raise the critical transformation range of the steels to which they are added a safety factor is introduced against this change.

The possible occurrence of grain growth in cracking furnace tubes is limited to a certain few non-airhardening types of steel but may also occur in tubes which have been critically cold-deformed and not subsequently heat treated.

Carbide precipitation in the grain boundaries is one of the objectionable characteristics of the 18-8 stainless steel resulting from certain operating conditions. It is commonly assumed that this precipitation lowers the chromium content of the metal in the vicinity of the grain boundaries and this may lead to intergranular oxidation or corrosion. Suitable addition of titanium or columbium to this type of steel effectively prohibits this intergranular attack.

Temper embrittlement is the loss of room temperature impact resistance due to operation at elevated temperatures. The straight chromium steels of all grades are especially susceptible to this phenomenon. The addition of molybdenum affords the most suitable means at the present time for preventing it.

Temper embrittlement is also of special importance in the case of bolting steels. The extent to which the frequently used chromium-nickel bolting steels are susceptible is shown in Figure 14. This figure likewise shows the effectiveness of molybdenum in eliminating this tendency in the straight chromium steels.

In the development of the higher chromium Sicromo steels special attention has been given to each of the phenomena which may adversely affect structural stability in order that the steels finally offered as commercial compositions will be free from these changes and thus capable of rendering the most satisfactory service.

The retention of a high degree of ductility after prolonged service is of fundamental importance. This applies both to the room temperature ductility and the ductility at the given operating temperature.

In evaluating the ductility of cracking still tubes after prolonged service it is believed that consideration must be given to the impact resistance as well as to the ductility characteristics as ordinarily determined in the tensile test. This is true because during cleaning operations these tubes may be subjected to impact stresses.

While the straight chromium steels and certain of their modifications frequently exhibit this shortcoming it can in general be eliminated by the addition of molybdenum together with suitable heat-treatment. To date molybdenum is the only element known which effectively performs this function.

The stress-rupture test as developed during our investigation of the Sicromo steels offers an ideal means for determining the influence of stress and time on the hot ductility. Retention of a high degree of hot ductility is of importance in order that bulging will occur and thus give warning of pending failure.

Figure 15 is included as an example of loss in hot ductility under the combined influence of time and stress on plain carbon steel at 1,000° F. It will be observed that with increasing fracture time periods the elongation drops from an original value of over 40 per cent to one of approximately 10 per cent. In this case the decrease in ductility is largely due to intergranular oxidation which in turn is an indication of lack of sufficient surface stability.

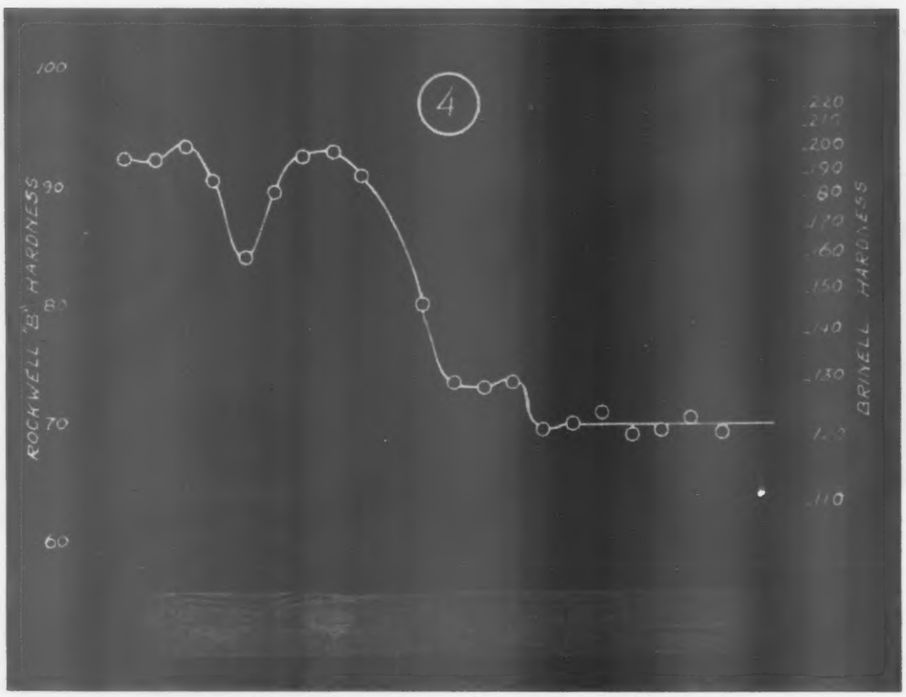
The variations possible in the stability of higher alloyed steels is indicated in Figure 16. Sicromo 5, which differs from the 5 Cr-Mo steel only in that it contains a greater silicon content, retains its original high ductility while the regular 5 Cr-Mo steel suffers an appreciable loss in ductility after only 1,000 hours at 1,200° F.

It is also interesting to note that the stainless 18-8 steel rapidly loses its ductility at 1,300° F. This explains why in service brittle fractures are frequently encountered with this material.

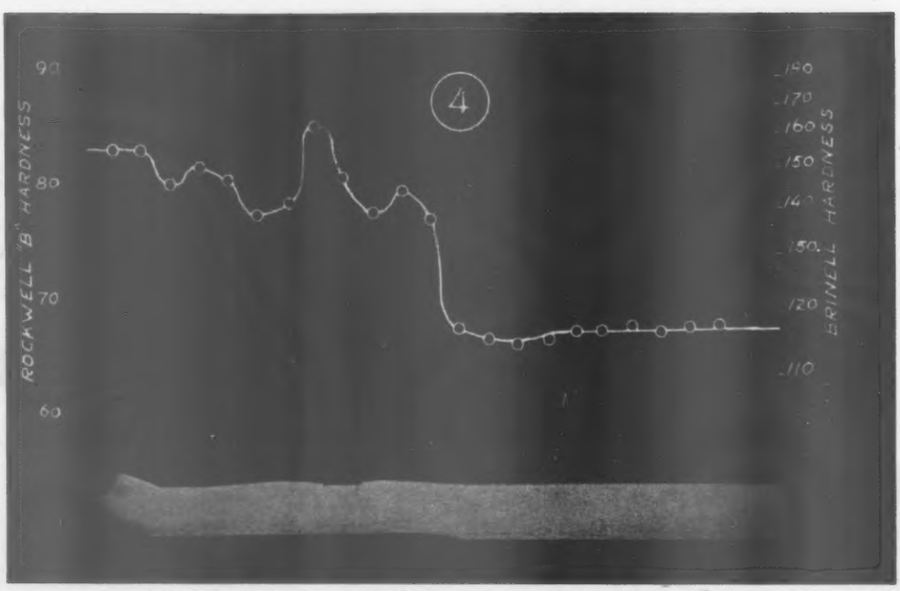
The loss of hot ductility can often be attributed to lack of sufficient surface stability. It is for this reason that it is believed advisable to have appreciable silicon present in all steels intended for high temperature applications. The Sicromo steels take advantage of the beneficial influence of increased silicon content.

Recent developments in the petroleum industry have created a demand for steels capable of resisting the attack of hydrogen under high pressure at elevated temperatures. Not only does the attack of hydrogen result in decarburization but under extreme conditions actual fissuring results which in turn causes the steel to become brittle.

The effect of various elements in protecting



Inner surface of tube end, hardness values taken on inner surface



Etch test and hardness values taken on radial section

Figure 18

-BRADEN *Refinery Buildings*

BRADEN STEEL CORPORATION TULSA OKLA

BRADEN Sectional Steel Buildings have long been a favorite with the Refining Industry because these buildings offer every feature that is desirable from the standpoint of true economy.

Economy features include: Low Initial Cost—Low Erection Cost—Minimum Maintenance—and 100% Salvage. In addition, BRADEN Buildings are readily adaptable to any required style or size; and they present a most attractive appearance.

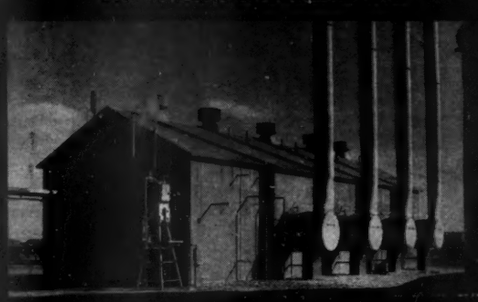
BRADEN will gladly submit designs for your refinery buildings—without obligation. "16 Years of Reliability and Service".

DESIGNERS — FABRICATORS — ERECTORS

BRADEN STEEL CORPORATION

1007 E. Admiral Blvd. Tulsa, Okla.

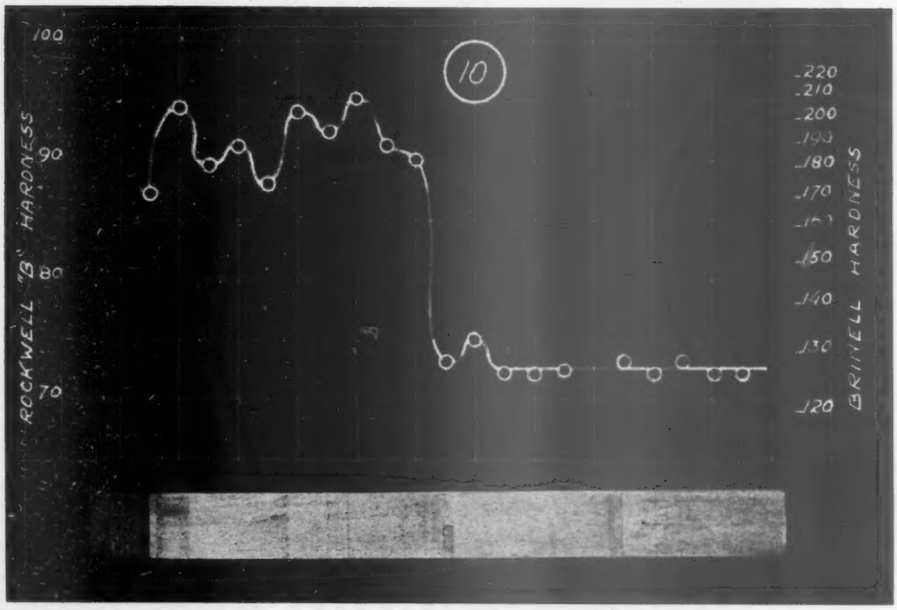
Gulf Coast Representative: Brance-Krachy Co., Inc.,
4411 Navigation Blvd., Houston, Texas



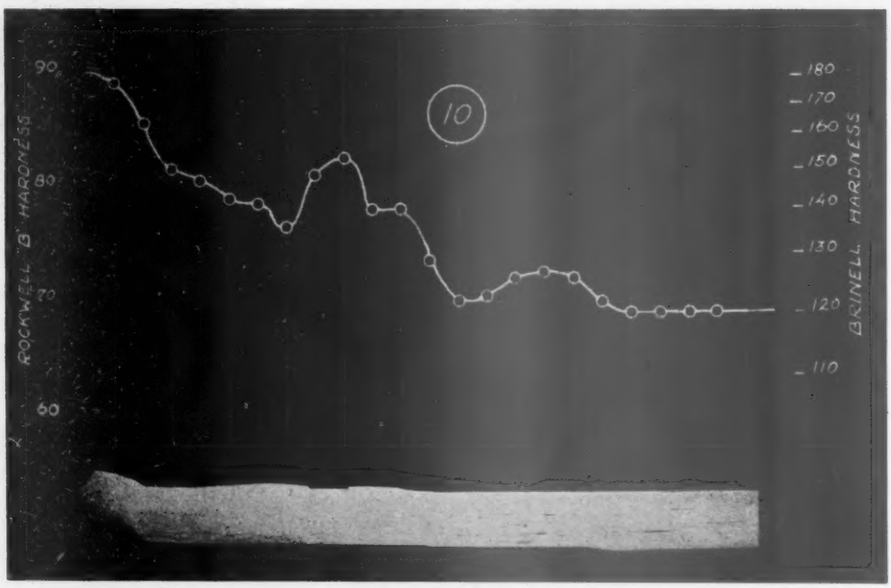
See BRADEN Section in Composite Catalog

BRADEN

Section through internally and externally upset and machined tube end

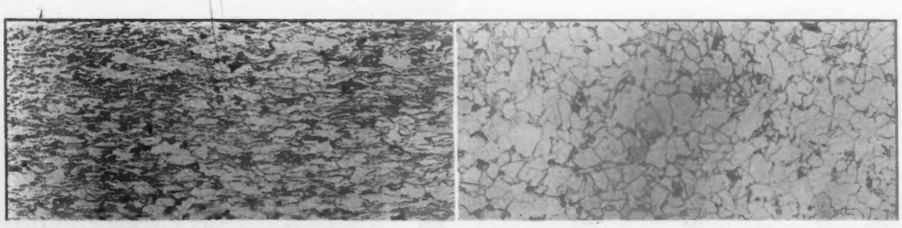


Inner surface of tube end, hardness values taken on inner surface



Etch test and hardness values taken on radial section

Figure 19



Structure in unworked area

Structure in area of greatest deformation

Figure 20

ferrous alloys from the attack of hydrogen is shown in Figure 17. It will be observed that the elements which form the most stable carbides are, even in small amounts, effective in preventing this phenomenon. While chromium is not the most effective of the elements considered it will be noted that a chromium content slightly in excess of 3 per cent offers a high degree of protection.

With steels intended for use as tubes in oil cracking stills it is of course essential that the composition and heat treatment be so adjusted as to assure room temperature properties which will permit satisfactory fabrication and installation. A number of A.S.T.M. specifications covering tubular products demand technological tests, such as flattening and flaring tests, which assure that the tubes will possess these necessary characteristics.

As most cracking still tubes are installed by rolling them into headers it might be well to mention here certain development work which has been conducted recently in this field. The use of higher temperatures and pressures makes this problem of special importance in order to eliminate leakage.

Tube Ends

The recent trend is to the use of upset and machined tube ends. This assures absolutely concentric tube ends free from decarburization and surface imperfections and allows additional stock to take care of the flow of the material during rolling. It also permits an accurate control of the amount and uniformity of deformation during rolling.

Figure 18 shows the appearance of the inside surface and a radial section through the wall of a conventionally rolled tube end. The graphs above the sections indicate the changes in hardness as a result of the rolling-in operation. It is to be observed that the inside surface is severely cold-worked, which frequently causes flaking, and that considerable thinning of this section has occurred. This is especially objectionable since the most severe corrosion usually occurs on the tube ends. The importance of having sufficient strength in the headers to support the rolling pressures and to balance the strengthening of the tube wall during the cold working operation is evident.

Figure 19 shows a section through an internally and externally upset tube end machined to close tolerances and likewise the appearance of the inner surface and radial section after the rolling-in operation. As before similar hardness values are included. Unlike the previous condition the inner surface has remained smooth and free from all defects and the radial section indicates that the wall thickness has been well maintained.

The effect of cold working on the microstructure of the steel, as produced during the rolling-in operation of a carbon tube, is shown in Figure 20. It is generally assumed that the preferential corrosion attack on the ends of the tube may be associated with the deformed crystal structure.

As has been indicated there are certain definite characteristics steels must possess in order to render satisfactory oil refinery service. In the development of new steels special consideration has to be given to each of these factors for a steel may be outstanding in certain respects and still be incapable of good performance if certain of its other characteristics are undesirable. For example, some analyses may possess high strength combined with good oxidation and corrosion resistance and yet be unsatisfactory because they become brittle during service.

EVERY REFINERY EXECUTIVE NEEDS THIS BULLETIN

SEAL ARRANGEMENT TO OBTAIN LOW-PRESSURE PACKING
(A-72)
View shows arrangement of balanced floating seals for high suction pressure, high temperature conditions. The floating seal shown at "A" balances the throw of the rotating assembly, sleeve, pressure drop to suction pressure in by-pass chamber. Floating seal "B" drops suction pressure to any desired pressure, such as 25 to 50 pounds. In the balanced floating seal, the floating rings shown as "A" and "B" are stationary while the discs rotate with the shaft. The seal rings "A" and "B" automatically float without touching the discs by reason of the balanced pressure across the faces. The ring automatically balances whether the pressure drop is 200 pounds or 2,000 pounds. Parts are corrosion-proof and faces are hard-faced. Patented July 9, 1935, and July 20, 1937. Other patents pending.
DESIGN FEATURES
SEAL ARRANGEMENT TO OBTAIN LOW-PRESSURE, LOW-TEMPERATURE PACKING
(A-73)
View shows special arrangement of mechanical and floating seals for high suction pressure, high temperature conditions. "B"—Mechanical Seal. "C"—Balanced Floating Seal. A small auxiliary circulating pump is used to circulate cool, clear fluid into the chamber at "D," maintaining pressure at 25 to 50 pounds above suction pressure of the pump. The mechanical seal at "B" is required to operate only under a low differential pressure. The pressure drop is taken across the balanced floating seal "C" with outlet at "E," and stuffing boxes operate under low temperatures and low pressures. Patented July 9, 1935, February 21, 1933, and July 20, 1937. Other patents pending.

SEND FOR YOUR COPY TODAY

Your name on your Company letterhead will bring you a copy of the valuable "PACIFIC" Bulletin without charge.

DISCOVER NEW ECONOMIES AND EFFICIENCIES IN HOT OIL PUMPING

In this new Bulletin are shown the sizes, types and installations of "PACIFIC" High-Pressure Centrifugal Pumps that are successfully pumping high-temperature liquids in plants throughout the world. Back of these "PACIFIC" Pumps stands the experience and engineering knowledge that have solved the problems of pumping liquids—with temperatures up to 850° F., with differential pressures up to 2500 lbs., capacities to 2700 G.P.M.—efficiently and economically. This complete story of "PACIFIC" Pumps is available to refinery executives and engineers without obligation.

PACIFIC PUMP WORKS

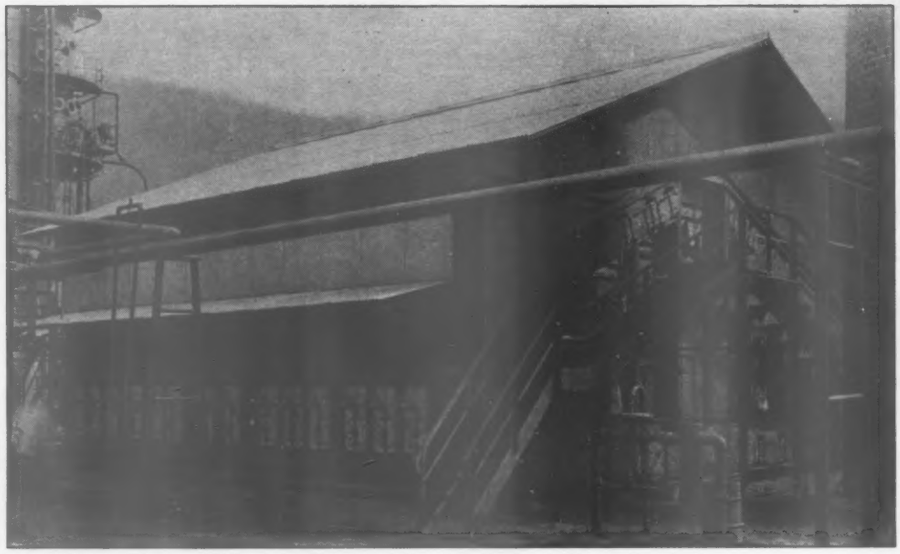
5715 BICKETT STREET
HUNTINGTON PARK, CALIFORNIA

530 HARDING DRIVE
SOUTH ORANGE, NEW JERSEY

PACIFIC PUMPS

Cooperative Cracking Plant at Oil City Expands

By J. P. O'DONNELL



New heavy oil furnace at "community" cracking plant

The recent addition of a heavy oil furnace that raised the capacity from 2,500 to 4,500 bbls. per day and made it the largest cracking plant operating solely on Pennsylvania charging stock again has focused attention on the "community" plant operated cooperatively by four Oil City, Pa., refineries, one of the most unique arrangements in the oil industry today. Addition of the new furnace, conversion of the old heavy oil furnace to a light oil furnace, addition of a primary flash chamber and the installation of a centrifugal hot-oil pump and flow-control valves constitute the latest in a series of modernization steps during the highly successful eight-year life of the plant. It was put in operation in June, 1931.

Generally conceded to be a certain failure, except by the participants, before it was built, the plant has been operated to the complete satisfaction of the four participating companies: The Pennzoil Co., James B. Berry Sons Co., Inc., Wolverine-Empire Refining Co. and Continental Refining Co. The complete success of the arrangement is attested not only by the recent expansion but also by the addition of a polymerization unit, now under construction. In addition the original five-year contract has been extended and, apparently, is permanent.

Most attractive feature of the arrangement is, of course, the substantial reduction in costs of processing. On account of its size, the cooperative plant naturally has a lower cost per barrel than any of the companies could have attained individually. Approximately the same number of men would be required to operate a plant of smaller capacity so that there is likewise a very large saving in labor and operating costs.

The plant is on the property of the Pennzoil Co. and two of the other refineries, the independent plant of the James B. Berry Sons Co., Inc., and the Continental Refining Co. are adjacent. However, the Wolverine-Empire refinery is in Reno, about 5.5 miles distant. Transportation of the charging stock, is the consideration of the individual refinery, the cooperative arrangement beginning when the charging stock, normally a 39.1° gravity fuel oil, reaches the charging stock tanks.

Gauging at the stock tanks at the cooperative plant is done under the supervision of a referee who in reality represents the non-Pennzoil interests since the Pennzoil stock is already at the plant. The referee also oversees the gauging of finished gasoline before delivery to the refiners. Hourly samples are taken of both the charge and product and distillation tests are run on each. Distillation tests are also made on every delivery to the plant and on each tank before it is charged to the unit.

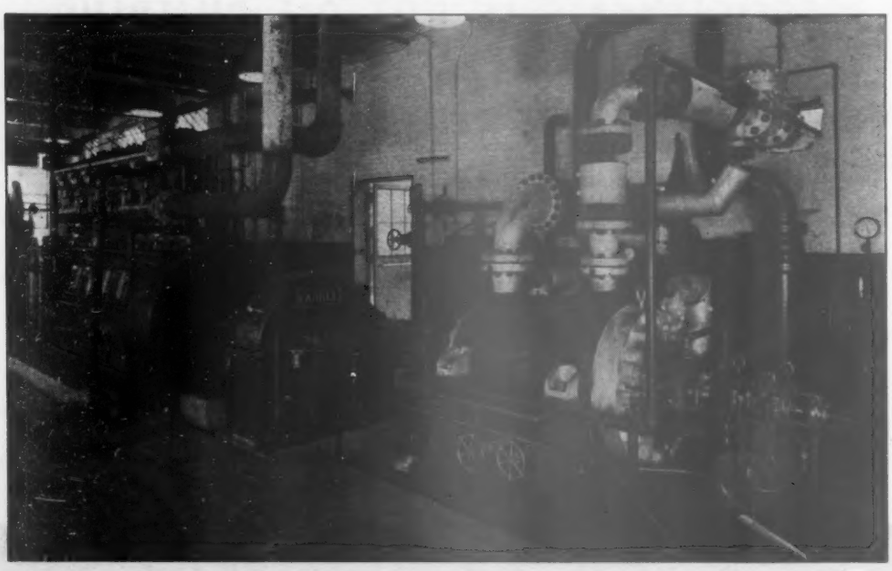
The cooperative arrangement extends beyond the cracking plant when one of the outside interests desires to have kerosene or naphtha reformed. In this case the Pennzoil Co. reforms the kerosene or naphtha in its own unit, especially designed for this purpose. If the yield is greater than by cracking, the supplying company is credited for it in proportion to the amount of charge that would be required to obtain the same yield by cracking. This and all other operations are under the direct charge of the Pennzoil Co. since the plant is situated on Pennzoil property and because it has the largest interest, 59 per cent.

The present division of interest in addition to that of the Pennzoil Co. is James B. Berry Sons Co., Inc., 22.4 per cent; Wolverine-Empire Refining Co., 13 per cent, and Continental Refining Co., 5.6 per cent. Originally the Continental percentage was greater than at present and that of the other outside interests less. However, when Continental, since there was ample capacity already to satisfy all its requirements, did not participate in the expansion, its percentage of the total was automatically reduced and that of the others raised.

Disposition of products other than gasoline varies. The Pennzoil Co. disposes of all residual fuel oil and each of the other companies is credited with its proportionate share of the revenue. A portion of the dry gas is consumed in the unit while the neighboring Continental and independent plants each use some for fuel. The Wolverine-Empire Refining Co. is given credit for its share since its distance from the plant prohibits the economical use of the gas.

A problem that far transcended those involved in the operation of the plant was that of accounting. Among the factors that were necessary to consider were the type, quality and quantity of the charging stock supplied by four refineries for

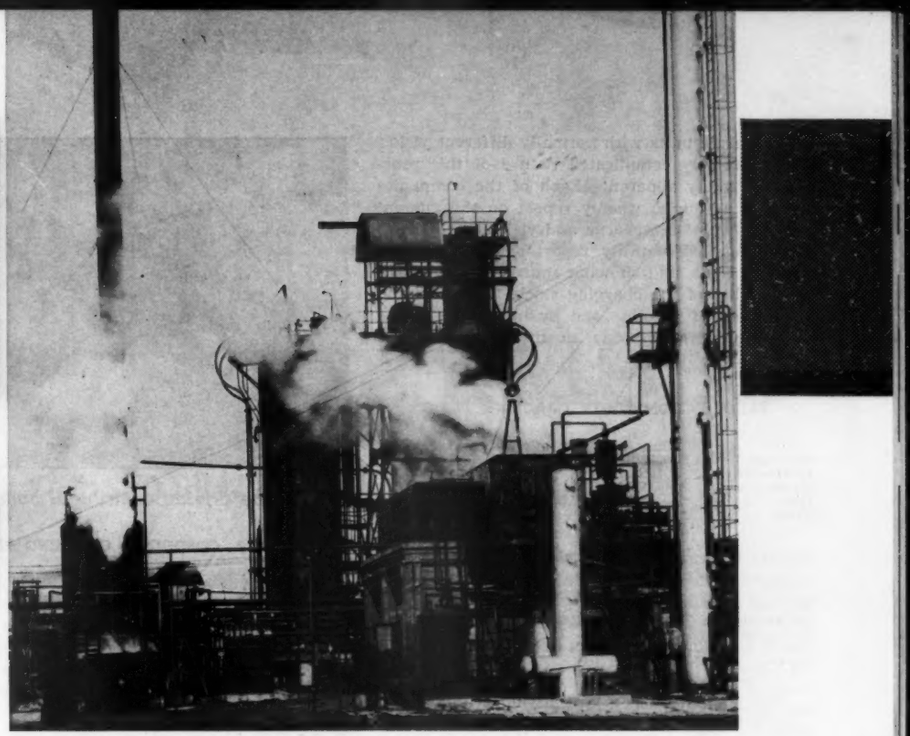
(Continued on Page 144)



***Centrifugal hot-oil pump in foreground** reduction gears, center, and gas engine, rear*

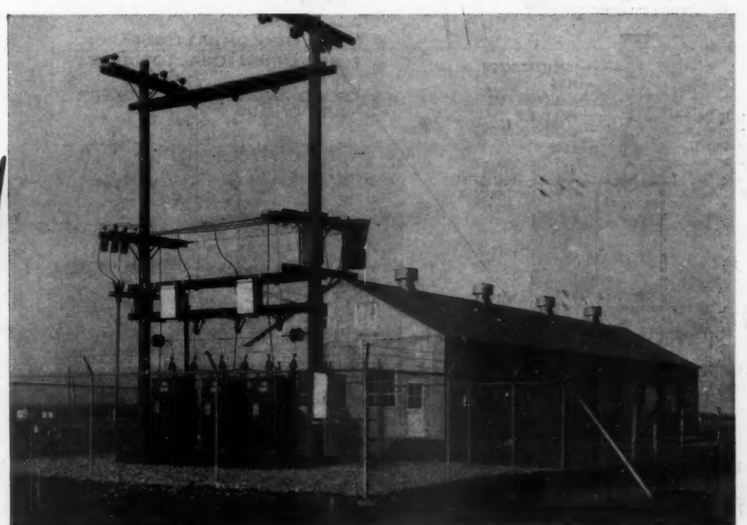
POWER

REFINING



PRODUCTION

PIPE LINES



PROFIT!
Purchased
ELECTRIC POWER

PETROLEUM ELECTRIC POWER CLUB

two separate units with normally different yields. The extremely complicated nature of this problem is readily apparent. Each of the companies receives a concise weekly report on the amount and quality of the charge and yields and exhaustively detailed monthly report detailing and allocating costs, and showing source, amount, type and quality of the charging stock, the yields and disposition of gasoline and by products. All accounting work is done in the offices of the Pennzoil Co.

TABLE 1—COMMUNITY CRACKING PLANT

	Bbls./run	Per cent	Bbls./mon. (28 days)	Per cent
Raw oil	135,938	...	115,838	...
Overhead dist.	102,174	75.2	87,056	75.1
Residuum	18,347	13.5	15,585	13.5
Gas	14,737	10.8	12,617	10.9
Loss	680	.5	580	.5

Pennzoil Reforming Unit

	Bbls./run	Per cent	Bbls./mon. (31 days)	Per cent
Raw oil	54,327	...	43,997	...
Overhead dist.	41,776	76.9	34,065	77.4
Residuum	4,260	7.8	3,618	8.2
Gas	8,032	14.8	6,100	13.9
Loss	269	.5	214	.5

The plant itself is a typical Dubbs unit. However, it has a distinctive feature in the Worthington gas engine-driven, seven-stage centrifugal hot-oil pump supplying the heavy oil furnace. This is a comparatively small installation, requiring less than one-fourth the floor space taken by the unit it replaced. It provides a steady, constant flow with fuel costs that are low since it operates on gas from the unit. Its normal throughput of combined feed and reflux oil is approximately 12,000 bbls. per day with a discharge pressure of 780 pounds. The split-feed heavy-oil furnace is equipped at the inlet with flow-control valves which allow the maintenance of equal flows to the two coils.

Gas engine driving centrifugal hot-oil pump

TABLE 2—COMMUNTY CRACKING PLANT

	Raw oil	Gasoline*
Gravity, degrees A.P.I.	39.1	63.9
I.B.P.	290	82
5 per cent	445	102
10 per cent	480	118
20 per cent	531	148
30 per cent	563	179
40 per cent	587	212
50 per cent	612	242
60 per cent	634	268
70 per cent	659	297
80 per cent		322
90 per cent		357
95 per cent		369
Endpoint	659	
Per cent recovered	71	93.5
Per cent off at 375° F.	2.5	...
Per cent off at 400° F.	3.0	...
Per cent off at 410° F.	3.0	...
Per cent off at 437° F.	4.0	...
Per cent off at 572° F.	34.0	
Vapor pressure	...	12
Octane rating	...	68.5
Color	...	17

Pennzoil Reforming Unit

Gravity, degrees A.P.I.	46.1	62.6
I.B.P.	238	84
5 per cent	321	108
10 per cent	362	122
20 per cent	396	151
30 per cent	412	182
40 per cent	431	220
50 per cent	445	250
60 per cent	459	278
70 per cent	477	302
80 per cent	496	327
90 per cent	536	357
95 per cent	592	380
Endpoint	660	
Per cent recovered	97	96
Per cent off at 437° F.	44	...
Per cent off at 572° F.	93.5	...
Vapor pressure	...	12.3
Octane rating	...	67.5
Color	...	7

*Tank distillation.

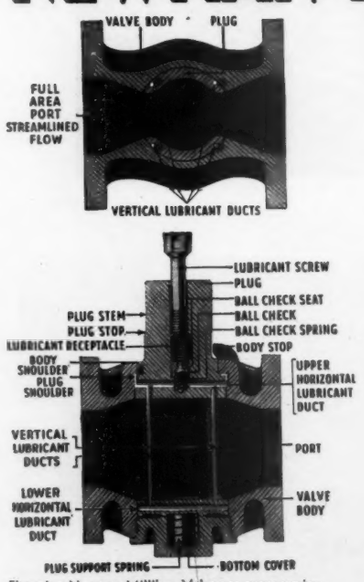
TABLE 3—COMMUNITY CRACKING PLANT

Temperatures—	Heavy oil	Light oil
Furnace:		
Bank A	1,400	1,410
Bank B	1,380	1,455
Bank C	1,350	1,410
Bank D	1,350	1,455
Furnace inlet	700	615
Transfer	936	955
Reaction chamber	...	900
Flash chamber inlet	...	800
Flash chamber top	...	770
No. 2 flash chamber inlet	...	765
No. 2 flash chamber top	...	620
Fractionation top	...	375
Fractionation middle	...	615
Fractionation bottom	...	705
Pressures:		
Heavy oil pump discharge	...	780
Light oil pump discharge	...	540
Reaction chamber	...	380
Flash chamber	...	100
No. 2 flash chamber	...	14
Fractionating pressure	...	100
Absorber	...	50
Heavy oil pump r.p.m.	...	2,970
Light oil pump r.p.m.	...	2,150

Pennzoil Reforming Unit

Temperatures—		
Furnace:		
Bank A	1,450	...
Bank B	1,455	...
Bank C	1,220	...
Bank D	1,225	...
Vapors to exchanger	790	...
Tube still inlet	500	...
Tube still outlet	900	...
Heating tube to soaking tube	925	...
Fractionation column inlet	680	...
Pressures:		
Recycle oil pump	700	...
Quenching pump	550	...

NEWMAN-MILLIKEN GLANDLESS LUBRICATED PLUG



There is a Newman-Milliken Valve for every service. Special patterns in special metals are available and pressures ranging from vacuum to 3,000 lbs. per square inch can be dealt with.

SOLE LICENSEES THROUGHOUT THE WORLD WITH THE EXCEPTION OF THE U. S. A.

Newman, Hender & Co. Ltd

WOODCHESTER, GLOS. ENGLAND.

Catalog No. 55M on application

NOTE THEIR UNIQUE FEATURES:—

- PARALLEL PLUG—ALWAYS IN CLOSE WORKING CONTACT WITH ITS BODY SEATING, NO GRIT CAN THEREFORE GET BETWEEN THESE TWO SURFACES.
- NO GLAND—NO PACKING—NO GASKETS.
- SELF SEALING.
- VISUAL CHECK ON FULL LUBRICATION.
- PORT OPENINGS EQUAL TO FULL SIZE PIPE AREA.
- OPENED AND CLOSED BY QUARTER TURN OF PLUG.

VALVES

THE VALVE THAT HAS PROVED ITSELF EMINENTLY SUITABLE FOR HANDLING PETROLEUM PRODUCTS IN ALL STAGES FROM THE CRUDE TO THE MOST HIGHLY REFINED SPIRITS.

INSTALLATION SHOWING NEWMAN-MILLIKEN VALVES ON HORIZONTAL MANIFOLD

Total Capacity Operating Plants Shows Slight Decline in 1939

By D. H. STORMONT

For the first time in recent years the total operating capacity of refineries in the United States failed to show a gain as compared with the previous year; and conversely, the number of operating plants failed to show a decrease. The number of plants in the United States, both operating and shutdown, however, continued to decline slightly while the total cracking capacity reversed its trend to show a decrease. Total crude capacity fell off slightly during 1938 and on March 1 was some 50,000 bbls. lower than at that time in 1938.

There were 463 operating refineries and 95 shutdown plants on March 1 of this year, representing a decline of six in the number of shutdowns and an increase of 12 in the number of operating plants as compared with a year ago. A comparatively large number of small plants were built during the year, mostly in Illinois, Montana and Texas. Due to their small capacities, however, they failed to offset the capacity of the many plants that were dismantled during the year. Also, a number of plants that were shutdown for the past five or six years were removed from the list as being too obsolete, or in such bad state of repair, to be classified as a refinery. These were mostly in Texas. Thus it would appear that the downward trend in the number of plants in the United States, which began in 1934, has about reached its low point, unless a situation similar to that which took place in the East Texas field again occurs. Discovery of the East Texas field led to the building of some eighty-odd plants in that area, almost all of which have since been dismantled.

Total capacity of the 558 plants was 4,456,620 bbls. daily, some 50,000 bbls. lower than on March 1, 1938, but still second to the highest in the industry's history. Of this total 4,186,555 bbls. capacity was in operation and 270,065 bbls. shutdown comparing with 4,301,910 bbls. operating capacity and 209,250 bbls. shutdown capacity at this time a year ago. Thus it may be seen that while the operating capacity showed a decrease of about 115,000 bbls., the shutdown capacity for the first time in several years showed a rather substantial increase. In the neighborhood of 100,000 bbls. of refinery capacity that was listed as shut down in the 1938 survey was removed from the list this year. The capacity of the large number of plants that were shut down during 1938, however, exceeded even this amount so that the shutdown capacity was even higher than on March 1, 1938.

Despite a decrease of 18 in the total number of plants and a decline of six in the number of operating refineries, Texas showed only a negligible decrease in total refinery capacity and active capacity slightly increased. On March 1, 1939, there was a total of 137 plants in Texas of which 106 were in operation, as compared with a total of 155 plants in 1938 with 112 in operation. Comparable total capacities and active capacities on March 1, 1939 and 1938 were 1,322,985 and 1,255,700 bbls., and 1,326,865 and 1,241,150 bbls., respectively. Additions to capacity and new plants built in the interior of Texas during the past year were substantially below the amount of capacity dismantled, so that the 1939 capacities were kept on a level with those of 1938 mainly by the amount of construction that took place in Southwest and Gulf Coast Texas.

Effect of Illinois

Due to development of flush production in the Central Illinois basin, the number of operating plants in that state increased from 11 to 17. These new plants, however, were mostly small so that its total refining capacity increased only 20,000 bbls., from 144,400 to 165,500 bbls. daily. One plant, of 2,000 bbls. capacity, was dismantled in Illinois during the year.

In Montana, due to producers losing their outlets to Canadian refineries, the number of plants and capacity likewise showed an increase. This state on March 1 had 35 refineries, of which 29 were in operation, with a total capacity of 39,005 bbls. This compared with 28 plants, 20 in operation, at that time last year with a total capacity of 32,790 bbls.

New states appearing on the accompanying table for the first time are Idaho and Washington. Plants were built in these states last year. Idaho, with two plants, has a capacity of 2,000 bbls. daily and Washington with one plant of 3,000 bbls. capacity.

In Oklahoma, Pennsylvania, Kansas and several of the other states that had their maximum refining capacity several years ago, the number of plants and capacity continued to decline slightly. Oklahoma, with 34 plants, has a capacity of 251,750 bbls. daily as compared with 39 plants and 252,390 bbls. capacity in 1938. Active capacity in Oklahoma increased slightly, while the number of shutdown plants remained the same. In Pennsylvania the number of plants declined from 37 to 35 in 1938 and active capacity from 323,100 bbls. to 304,500 bbls. The state now has 32 operating refineries as compared with 34 a year ago.

Total capacity of shutdown and operating cracking units declined during 1938 and on March 1, 1939, was 2,107,025 bbls. daily as compared with 2,327,215 bbls. at that time in 1938. Thus decrease was due mainly to the dismantling of shutdown units so that the active capacity is about the same.

Just what trend refineries will follow in the future with respect to number and capacity remains indefinite and although most students of the industry feel that fewer but larger plants will be the trend, high distribution costs on the products of the plants seem to favor the industry moving in the opposite direction.

Examples of both trends may be cited directly from the records of 1938. In that year, for example, the Richfield Oil Corp. dismantled one of its California plants and erected a new one in the same general area and in the new plant the operations of three plants formerly operated by the company are now consolidated. The new plant is located at Watson. While this was in progress five refineries of small capacity were being erected in the Illinois basin fields. Some of them utilized equipment which formerly operated in the East Texas field and in this transition the industry is repeating its old practice moving to the oil fields where flush crude oil production is available.

Growth of Refinery Capacity in United States

	Number of refineries	Total crude capacity (bbls. daily)	Number of operating refineries	Capacity of operating refineries (bbls. daily)	Total cracking capacity (bbls. daily)
1914	176	.....	...	.....	.....
1918	267	1,186,155	..	.....	.....
1919	289	1,295,115	..	.....	.....
1920	373	1,530,565	...	.....	.....
1921	415	1,888,800	..	.....	.....
1922	479	2,164,050	325	1,854,590	.....
1924	574	3,046,790	362	2,549,490	.....
1925	584	3,033,682	385	2,680,052	(*)
1926	515	3,068,340	356	2,770,340	980,960
1927	462	3,224,307	328	2,964,427	1,245,980
1928	456	3,426,330	315	3,116,930	1,327,584
1929	463	3,719,550	341	3,454,250	1,487,950
1930	479	3,972,460	362	3,721,360	1,765,299
1931	500	4,164,080	397	3,913,180	1,844,609
1932	510	4,093,370	383	3,665,830	1,954,550
1933	567	4,125,250	424	3,696,410	1,823,521
1934	628	4,243,033	483	3,790,593	1,838,420
1935	687	4,281,694	496	3,815,470	2,126,620
1936	640	4,301,754	479	3,936,535	2,130,800
1937	603	4,277,860	471	4,038,010	2,172,330
1938	562	4,511,160	451	4,301,910	2,327,215
1939	558	4,456,620	463	4,186,555	2,107,025

*Not available previous to 1926.

Personnel of United States Refineries

ABBREVIATIONS USED

Chm. Bd.—Chairman of Board
Pres.—President
V. P.—Vice President
Sec.—Secretary
Treas.—Treasurer
Gen. Mgr.—General Manager
Gen. Supt.—General Superintendent
Sales Mgr.—Sales Manager
Tankcar S. M.—Tankcar Sales Manager
Station S. M.—Station Sales Manager
Pur. Agt.—Purchasing Agent
Traf. Mgr.—Traffic Manager
Ch. Engr.—Chief Engineer
Supt.—Superintendent
Asst. Supt.—Assistant Superintendent
Ch. Chem.—Chief Chemist

A

Advance Refining Co., Inc., Tenth and Walnut, Centralia, Ill.

J. J. Taxman, *Pres.* I. W. Miller, *V. P.* Maynard Taxman, *Sec.-Treas.* and *Gen. Mgr. Ref.* Larry Kleen, *Gen. Supt. Ref.* Milow Taxman, *Sales Mgr.* C. W. Hulland, *Traffic Mgr.* and *Pur. Agt.* Refinery located at Centralia, Ill.

Aerex Co., The, Bloomfield, N. M.

A. C. Kittell, *Pres.* V. A. Kittell, *V. P.* G. D. Noland, *Sec.* A. C. Kittell, *Gen. Mgr. Ref.* and *Pur. Agt.* Refinery located at Bloomfield, N. M.

Aero Gas Refining Co., Fort Stockton, Tex.

J. C. Williams, *Gen. Mgr.* Refinery located at Fort Stockton, Tex.

Aetna Oil Service, Inc., 1202 S. Third St., Louisville, Ky.

W. R. Abbott, *Pres.* W. T. Davis, *V. P.* and *Sec.* Martin J. Quinn, *Treas.* C. M. Alexander, *Gen. Mgr. Ref.* E. E. Van Buren, *Ref. Supt.* Walter Norman, *Ch. Chem.* John Vyn, *Ch. Engr.* E. C. Wolff, *Pur. Agt.* Refinery located at Louisville, Ky.

Airlane Petroleum Corp., 809 V St., Oildale, Calif.

Mrs. Fred T. Murphy, *Pres.* John H. Bailey, Bakersfield, Calif, *V. P.* A. Senderman, *Sec.* and *Treas.* J. H. Fuller, *Gen. Mgr.* Refinery located at Oildale, Calif.

Allegany Refiners, Inc., P. O. Drawer E, Bolivar, N. Y.

C. A. Chipman, *Chm. Bd.* A. L. Shaner, *Pres.* D. V. McCarthy, C. A. Chipman, *V. P.s.* C. A. Chipman, *Sec.* W. E. Hammond, *Treas.* H. L. Chambers, *Asst. Sec.* H. J. Arnold, *Asst. Treas.* H. L. Chambers, *Gen. Mgr. Ref.* A. K. Wickham, *Gen. Supt. Ref.* H. O. Button, *Asst. Supt. Ref.* H. O. Button, *Ch. Chem.* A. K. Wickham, *Ch. Engr.* H. J. Arnold, *Pur. Agt.* Refinery located at Bolivar, N. Y.

Allied Oil Corp. of Illinois, Box 64, St. Elmo, Ill.

A. R. Matthews, *Pres.* L. B. Stableford, *V. P.* W. H. Rice, Jr., *Sec.* N. H. Mason, *Gen. Supt. Ref.* and *Pur. Agt.* Refinery located at St. Elmo, Ill.

Allstate Refining Co., Box 270, Tyler, Tex.

H. H. Coffield, *Pres.* George P. Mann, *V. P.* and *Gen. Supt. Ref.* J. H. Edwards, *Sec.-Treas.* and *Gen. Mgr. Ref.* Refinery located at Thrall, Tex.

Alpine Refining Corp., 7200 Manchester, Houston, Tex.

A. E. Richel, *Pres.* Roy F. Stewart, *Sec.* and *Treas.* B. E. Carter, *Supt.* Refinery located at Houston, Tex.

Alto Refining Co., Corpus Christi, Tex.

J. E. Connor and W. L. Goodson, *Partnership.* Refinery located at Clarkwood, Tex.

American Petroleum Co. (of Texas), Petroleum Bldg., Houston, Tex.

G. O. Irvine, *Pres.* T. J. Arnold, *V. P.* G. L. Townsan, *Sec.* C. T. Carnes, *Treas.* J. B. Joyce, *Mgr. of Oper.* S. J. Bell, *Supt. Ref.* H. P. Sellers, *Ch. Chem.* John H. Bringhurst, *Ch. Engr.* W. G. Freitag, *Pur. Agt.* J. M. Cook, *Sales Mgr.* Refinery located at Houston, Tex.

Amsco Refining Co., Box 1607, Corpus Christi, Tex.

Kent W. Bartlett, *Pres.* John D. Manley, W. C. Pearl, *V. P.s.* H. C. Pearson, *Sec.* Forest R. Lowrey, *Treas.* J. A. Bartlett, *Gen. Mgr. Ref.* J. U. Sheppard, Jr., *Ref. Supt.* E. G. Mehlburger, *Asst. Supt.* G. C. Allison, *Ch. Chem.* F. Geiger, *Pur. Agt* Refinery located at Corpus Christi, Tex.

Anderson-Prichard Refining Corp., 1000 Ramsey Tower, Oklahoma City, Okla.

L. H. Prichard, *Pres.* J. Steve Anderson, *V. P.* P. H. Anderson, *Sec.* and *Treas.* George H. Burruss, *Gen. Mgr. Ref.* M. B. Burruss, *Ref. Supt.* W. M. Sturges, *Pur. Agt.* Refinery located at Cyril, Okla.

Arkansas Fuel Oil Co., Shreveort, La.

D. W. Harris, *V. P.* T. J. Heard, *Sec.* B. R. Muirhead, *Treas.* A. H. Weyland, *Gen. Mgr. Ref.* R. B. Pierce, *Gen. Supt. Ref.* G. W. Wilbur, *Asst. Supt.* J. A. Welch, *Sales Mgr.* E. M Hinkle, *Traf. Mgr.* A. W. Trusty, *Ch. Chem.* C. B. Whyte, *Ch. Engr.* J. Lucas, *Pur. Agt.* Refinery located at Bossier City, La.

Aromalene, Inc., 1840 E. Twenty-ninth St., Long Beach, Calif.

J. L. Bensinger, *Pres.* and *Gen. Supt. Ref.* M. C. Valdes, *V. P.* and *Ch. Engr.* Victor W. Posta, *Sec.* and *Treas.* Gordon Weeden, *Pur. Agt.* Refinery located at Signal Hill, Calif.

Arro Oil & Refining Co., 605 Montana Bldg., Lewistown, Mont.

H. H. Schwartz, *Pres.* Ed L. Allen, *V. P., Treas.* and *Gen. Mgr.* Guy R. Enlow, *Sec.* Paul Jones, *Gen. Supt. Ref.* Paul Cooper, *Ch. Chem.* Charles Cox., *Asst. Supt.* Refinery located at Lewistown, Mont.

Ashland Oil & Refining Co., Ashland, Ky.

Paul G. Blazer, *Pres.* W. H. Keffer, *V. P.* E. L. McDonald, *Sec.* E. W. Seaton, *Treas.* F. W. Irwin, *Supt. Ref.* F. Leo Bever, *Ch. Engr.* John S. Pfarr, *Ch. Chem.* M. K. Lovell, *Pur. Agt.* Refinery located at Catlettsburg, Ky. (refinery of Tri-State Refining Co., an affiliated company, located at Kenova, W. Va.)

Atlantic Refining Co., The, 260 South Broad St., Philadelphia, Pa.

J. W. Van Dyke, *Chm. Bd.* Robert H. Colley, *Pres.* W. D. Anderson, E. J. Henry, W. C. Yeager, W. M. O'Connor, E. H. Blum, R. C. Tuttle, A. A. Garrabrant, *V. P.s.* W. M. O'Connor, *Sec.* Paul Shuman, *Treas.* E. J. Henry, *Gen. Mgr. Ref.* H. M. Nichols, *Ref. Mgr. at Philadelphia, Pa.* Robert Stewart, *Ref. Mgr. at Atreco, Tex.* Dr. T. G. Delbridge, *Mgr. R. and D.* H. M. Hancock, *Ch. Chem.* L. M. Goldsmith,

REFINERY OPERATIONS IN NORTH AMERICA SEGREGATED ACCORDING TO PLANT LOCATION

State—	No. of plants	Daily crude capacity (bbls.)	Daily cracking capacity (bbls.)	No. of plants operating	Crude capacity operating plants	No. of plants shut down	Crude capacity plants shut down
UNITED STATES							
Alabama	1	4,000	.....	1	4,000	...	.....
Arkansas	6	36,750	11,500	6	36,750	...	.....
California	87	954,460	393,550	65	822,360	22	132,100
Colorado	12	13,180	4,880	10	11,830	2	1,350
Delaware	1	3,500	.....	1	3,500	...	.....
Georgia	1	4,000	.....	1	4,000	...	.....
Idaho	2	2,000	1,000	2	2,000	...	.....
Illinois	17	165,500	75,210	17	165,500	...	.....
Indiana	6	224,150	117,100	6	224,150	...	.....
Kansas	24	161,395	81,385	21	159,550	3	1,845
Kentucky	9	29,200	14,000	7	26,350	2	2,850
Louisiana	15	217,500	97,200	14	212,500	1	5,000
Maryland	3	47,500	51,500	3	47,500	...	.....
Massachusetts	2	50,600	15,720	2	50,600	...	.....
Michigan	24	67,500	14,550	21	61,300	3	6,200
Missouri	2	19,600	5,950	2	19,600	...	.....
Montana	35	39,005	10,250	29	35,580	6	3,425
Nebraska	6	2,775	.....	6	2,775	...	.....
New Jersey	9	229,000	141,100	9	229,000	...	.....
New Mexico	10	8,075	2,640	10	8,075	...	.....
New York	7	61,700	10,325	7	61,700	...	.....
Ohio	15	130,660	69,500	13	130,100	2	560
Oklahoma	34	252,750	101,250	23	212,000	11	40,750
Pennsylvania	35	304,500	149,550	32	300,500	3	4,000
Rhode Island	2	12,500	.....	2	12,500	...	.....
South Carolina	1	5,000	.....	1	5,000	...	.....
South Dakota	3	370	.....	3	370	...	.....
Tennessee	1	150	.....	1	150	...	.....
Texas	137	1,322,985	698,700	106	1,255,700	31	67,285
Utah	5	9,400	8,000	3	9,100	2	300
Virginia	1	2,000	.....	1	2,000	...	.....
Washington	1	3,000	1,250	1	3,000	...	.....
West Virginia	5	12,800	8,600	4	10,300	1	2,500
Wyoming	39	59,115	22,315	33	57,215	6	1,900
Total	558	4,456,620	2,107,025	463	4,186,555	95	270,065
CANADA							
Alberta	10	17,350	9,100	9	16,750	1	600
British Columbia	4	23,000	3,400	4	23,000	...	.....
Manitoba	4	3,600	500	4	3,600	...	.....
Northwest Territory	1	100	.....	1	100	...	.....
Nova Scotia	1	20,000	12,500	1	20,000	...	.....
Ontario	6	42,100	21,400	4	36,500	2	5,600
Quebec	5	64,500	29,000	5	64,500	..	.....
Saskatchewan	15	14,250	4,600	8	12,400	7	1,850
Total	46	184,900	80,500	36	176,850	10	8,050
MEXICO							
Total Mexico	5	139,000	12,900	5	139,000	....	.....

Ch. Engr. J. S. Parks, *Pur. Agt.* Refineries located at Philadelphia, Pa.; Atreco, Tex.

Atlas Oil Corp., 619 Market St., Shreveport, La.

R. E. Meinert, *Chm. Bd.* and *Pres.* E. W. Atkinson, *V. P.* E. P. Marrable, *Sec.* and *Treas.* J. L. Polk, *Asst. Treas.* J. B. Rogerson, *Gen. Supt. Ref.* Vernon B. Chance, *Asst. Supt.* R. D. Rushing, *Ch. Chem.* R. W. Nix, *Pur. Agt.* Refinery located at Shreveport, La.

Aurora Gasoline Co., 15911 Wyoming Ave., Detroit, Mich.

William E. Slaughter, Jr., *Pres.* H. E. Wenger, *V. P.* Max M. Fisher, *Sec.* C. S. Wenger, *Treas.* Larry Curran, Elsie, Mich., *Ref. Supt.* Robert Scoaa, Elsie, Mich., *Asst. Supt.* Harry Erickson, *Ch. Chem.* M. E. Slaughter, Jr., *Pur. Agt.* Refinery located at Elsie, Mich.

B

Bair, F. M., Oil Co., Grand Ledge, Mich.

Floyd M. Bair, *Pres.* Blanche Bair, *Sec.* Refinery located at Grand Ledge, Mich.

Baird Refining Co., Baird, Tex.

J. R. Parten, *Chm. Bd.* M. G. Blalock, *Pres.* R. P. Hargis, *Sec.* D. C. Biggers, *Treas.* Sylvester Dayson, *Gen. Mgr. Ref.* L. G. Dufilho, *Gen. Supt. Ref.* J. B. Misenheimer, *Ref. Supt.* J. E. Bullock, *Pur. Agt.* Refinery located at Baird, Tex.

Baker Petroleum Corp., Virgin, Utah.

Refinery located at Virgin, Utah. (Is leased from the Diamond Oil Co.)

Barber Asphalt Corp., Barber, N. J.

J. E. Auten, *Pres.* Frank Seamans, *V. P.* E. R. Riter, *Sec.* F. J. Robertson, *Treas.* Joseph Slutzker, *Gen. Mgr. Ref.* H. J. Fleischer, *Oil Refinery;* Percy Palmer, *Asphalt Refinery, Ref. Supts.* L. S. Schleck, *Asst. Supt., Oil Refinery.* Howard V. Smith, *Mgr. R. and D.* H. C. Howell, *Ch. Chem.* F. A. Spencer, *Ch. Engr.* A. J. Hollenbach, *Pur. Agt.* Refinery located at Barber, N. J.

Barnsdall Refining Corp., P. O. Box 2009, Tulsa, Okla.

William Dowey Loucks, *Chm. Bd.* O. L. Cordell, *Pres.* G. F. Racette and D. L. Frawley, *V. P.s.* E. R. Atwill, Jr., *Sec.* C. E. Votrain, *Treas.* O. L. Cordell. *Gen. Mgr. Ref.* F. S. Horne, Barnsdall, Okla.; V. R. Oakley, Wichita, Kans.; G. T. Granger, Corpus Christi, Tex., *Ref. Supts.* E. R. Wiles, Barnsdall, Okla., *Asst. Supt.* O. E. McClatchey, *Pur. Agt.* Refineries located at Barnsdall, Okla.; Okmulgee, Okla.; Wichita, Kans.; Corpus Christi, Tex.

Basin Refining Co., P. O. Box 96, Aztec, N. M.

D. J. Lingenfelter, *Owner.* Charles Riecke, *Supt.* Refinery located at Aztec, N. M.

Bay Petroleum Corp., The, Box 957, Denver, Colo.

Charles U. Bay, New York, *Pres.* Roland V. Rodman, *V. P.* and *Gen. Mgr.* Dent N. Hand, *Sec.-Treas.* W. R. Newman, *Gen. Supt.* L. L. Leabo, *Sales Mgr. of Denver* and *Cheyenne Divisions;* M. C. Bradshaw, *Sales Mgr., McPherson Division.* Ed M. Catron, *Prod. Supt.* Refineries located at Denver, Colo.; Cheyenne, Wyo.; McPherson, Kans.

Bay Refining Co., Bearinger Bldg., Saginaw, Mich.

James C. Graves, *Pres.* Howard D. Atha, *V. P.* Edward Reiser, *V. P.* and *Gen. Mgr.* T. G. Caley, *Sec.* and *Treas.* Frank Tiernan, *Ref. Supt.* Russell Potts, *Asst. Supt.* Refinery located at Bay City, Mich.

Bayou State Oil Corp., Ardis Bldg., Shreveport, La.

Paul M. Brown, *Pres.* and *Gen. Mgr.* Sidney M. Cook, *V. P.* Frank M. Cook, *Sec.-Treas.* Fred D. Coons, *Asst. Sec.-Treas.* Thomas N. Reed, *Ref. Supt.* J. D. Martin, *Prod. Supt.* Harry J. Sheard, *Ch. Chem.* and *Ch. Engr.* Fred D. Coons, *Pur. Agt.* Refinery located at Hosston, La.

Beacon Oil & Refining Co., Henderson, Tex.

T. P. Cannon, *Pres., Treas.* and *Gen. Mgr.* Mrs. Alice M. Roberts, *V. P.* T. A. Garnett, *Sec.* L. H. Barbee, *Gen. Supt. Ref.* Refinery located at Henderson, Tex.

Bears Den Refinery, Chester, Mont.

Refinery located at Chester, Mont.

Beck, G. T., Refinery, Box 348, Cody, Wyo.

G. T. Beck, Sr., *Owner.* Wilbert M. Taylor, *Ref Supt.* G. T. Beck, Sr., *Pur. Agt.* Refinery located at Cody, Wyo.

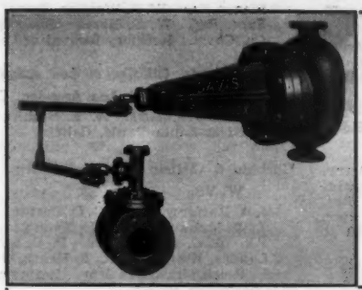
Bell Oil & Gas Co., Box 2007, Tulsa, Okla.

Samuel L. Lubell, *Pres.* B. L. Lubell, I. A. Anson, M. L. Freese, *V. P.s.* Ben P. Piepgrass, *Sec.* B. I. Lubell, *Treas.* I. A. Anson, *Gen. Supt. Ref.* A. Moore, Grandfield, Okla.; E. S. Horner, Ardmore, Okla., *Ref. Supts.* G. Jarrell, *Ch. Chem.* J. N. Naron, *Pur. Agt.* Refineries located at Ardmore, Okla., and Grandfield, Okla.

Benavides Refining Co., Benavides, Tex.

C. L. McIver, Kilgore, Tex., *Pres.* B. McCullum, *V. P.* Joe Presnall, Jr., *Sec.* and *Treas.* Refinery located at Benavides, Tex.

D A V I S



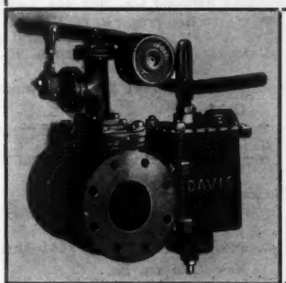
LIQUID LEVEL CONTROLS

Davis Liquid Level Controls are offered in a complete range of sizes and types, including units featuring the new "DIA-BALL" packless heads. The combination at the left shows a No. 161 D Packless Float Box actuating a No. 66 B Packless Balanced Valve.

Ask for descriptive bulletins.

STOP-AND-CHECK VALVES

Davis Stop-and-Check Valves are widely used for boiler plant protection in all branches of industry. No. 101 illustrated at the right is particularly designed for high pressure, heavy duty installations. It features an external oil dashpot, and a level which can be moved by hand to test valve action at any time. Offered in four body patterns.

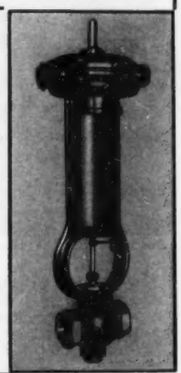


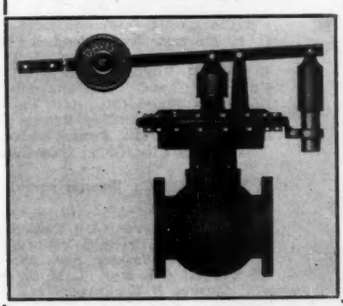
SOLENOID VALVES

Because Davis has long specialized in automatic valves for every type of service, the problem of giving you exactly what you want in a solenoid operated valve is just a matter of knowing your requirements. Standard designs are available from stock to meet practically any condition. Special assemblies can be produced on short order. The solenoid valve shown at the left is No. 97 SB featuring the "DIA-BALL" packless head and explosion-proof solenoid case. Literature on request.

PRESSURE REGULATORS

The Davis line of pressure regulators is complete—there is a type and size available to fit any job whether it be for gas, oil, steam, air, or water. Davis recommendations are not biased by any favored types. As this job indicates, you are free to choose between direct or pilot control . . . spring or weight loading . . . piston or diaphragm action. The type illustrated at the right is No. 14 C featuring a weatherproof housing for outdoor installations. CHOOSING the right type of regulator for any particular application is made easy by the new Davis Regulator Service Chart. Specifications and ratings according to service. Write for a copy.





GAS BACK PRESSURE VALVES

Davis Valves for gas service include the popular No. 330 Back Pressure Valve shown at the left. It is convertible for either vacuum or back pressure merely by reversing the counterweight. It features weatherproof construction, high sensitivity, and resistance to corrosion and wear. Complete range of standard sizes carried in stock.

STRAINERS

Davis Strainers are outstanding for their excellence of design and quality of construction. They are produced in Y-type (illustrated at right) and basket type styles. Sizes from 3/8" to 12" of bronze, semi-steel, or steel for steam, air, gas, water, and oil service.

DAVIS VALVES

DAVIS REGULATOR COMPANY

2543 SOUTH WASHTENAW AVE. CHICAGO, ILLINOIS

Berry Asphalt Co., 1472 W. Seventy-sixth St., Chicago, Ill.
P. R. Allen, *Chm. Bd.* B. H. Roberts, *Pres.* H. B. Pullar, *V. P.* A. H. Anderson, *Sec.* and *Treas.* A. T. Van Pelt, *Ref. Supt.* J. T. Clarke, *Ch. Chem.* J. W. Smith, *Ch. Engr.* J. W. Savage, *Pur. Agt.* Refinery located at Waterloo, Ark.

Berry, James B., Sons' Co., Inc., Quaker State Bldg., Oil City, Pa.
James D. Berry, *Pres.* S. Messer, Frank Berry, E. L. Cleaves, *V. P.s.* W. R. Reitz, *Sec.* Charles D. Berry, *Treas.* G. B. Hunter, *Gen. Supt. Ref.* Russell Buckham, *Ch. Chem.* Lee R. Forker, *Pur. Agt.* Harry Shoemaker, *Supt.* Refinery located at Oil City, Pa.

Berthoud Refinery, P. O. Box 336, Berthoud, Colo.
W. J. Cole and D. J. Lingenfelter, *Owners* and *Partners.* Refinery located at Berthoud, Colo.

Big West Oil Co. of Montana, 617 Hutton Bldg., Spokane, Wash.
L. R. Hawley, *Chm. Bd.* and *Pres.* E. R. Northrop, Charles P. Lund, *V. P.s.* John E. Orr, *Sec.* and *Treas.* M. D. Prince, *Asst. Sec.* and *Treas.* George Engle, *Gen. Mgr.* and *Supt. Ref.* L. J. Williams, *Ref. Supt.* L. R. Hawley, *Mgr. R. and D.* D. J. Mullady, *Ch. Chem.* L. J. Williams, *Ch. Engr.* George Engle, *Pur. Agt.* Refinery located at Kevin, Mont.

Black Gold Refining Co., Commerce Exchange Bldg., Oklahoma City, Okla.
R. G. Cocanower, *Sec.-Treas.* and *Gen. Mgr. Ref.* Refinery located at Oklahoma City, Okla.

Bradford Oil Refining Co., Box 197, Bradford, Pa.
E. R. Lederer, *Pres.* F. D. Korner, *V. P.* R. B. Sibley, *Sec.* and *Treas.* C. A. Barrere, *Mgr. Ref.* Raymond Bridiere, *Asst. Supt.* James Francis, *Ch. Chem.* J. von Varlovitz, *Pur. Agt.* Refinery located at Bradford, Pa.

Bradford Penn Refining Corp., Clarendon, Pa.
A. D. David, *V. P.* and *Gen. Mgr. Ref.* V. C. Burkhard, *Ref. Supt.* Kenneth Nielsen, *Asst. Supt.* W. A. Johnston, *Ch. Chem.* S. L. Myer, *Pur. Agt.* Refinery located at Clarendon, Pa.

Bridger Refinery, The, Bridger, Mont.
Hershal F. Best, *Owner.* Refinery located at Bridger, Mont.

Bryson Pipe Line & Refining Co., Waggoner Bldg., Wichita, Falls, Tex.
George Kimbell, *Pres.* Knox L. Garvin, Jr., *Gen. Mgr.* J. Clyde Hall, *Supt.* Refinery located at Bryson, Tex.

Bryson Refining Co., Inc., Bryson, Tex.
Refinery located at Bryson, Tex.

Bush, R. R., Oil Co., 2790 Cherry Ave., Long Beach, Calif.
R. R. Bush, *Chm. Bd.* and *Pres.* W. H. Morgan, *V. P.* and *Gen. Mgr.* Neil Ensch, *Sec.* and *Treas.* W. E. Snowden, *Mgr. Ref.* R. B. Rubottom, *Ref. Supt.* Phil Bessor, *Ch. Chem.* G. N. Crowther, *Pur. Agt.* Refinery located at Long Beach, Calif.

C

C.-H. Refinery, Lusk, Wyo.
James Mobbit. *Owner.* Refinery located at Lusk, Wyo.

California Oil & Refining Co., Seal Beach, Calif.
Refinery located at Seal Beach, Calif.

Carroll, L. Ray, Roundup, Mont.
L. Ray Carroll, *Owner.* Refinery located at Roundup, Mont.

Calumet Refining Co., 4323 S. Western Blvd., Chicago, Ill.
Van. S. Welch, *Pres.* T. A. Telfer, *V. P.* and *Gen. Mgr.* R. S. Watt, *Sec.* and *Treas.* Carl Harris, *Gen. Supt. Ref.* Refinery located at Burnham, Ill.

Caminol Co., Ltd., The, 112 W. Ninth St., Los Angeles, Calif.
C. B. Colby, *Pres.* R. E. Hines, *V. P.* and *Gen. Mgr.* W. B. Allen, *Sec.* T. Lipps, *Treas.* R. C. Colvin, *Gen. Supt. Ref.* M. W. Mueller, Santa Fe Springs, Calif., R. V. Monson, Hanford, Calif., *Ref. Supts.* D. H. Lewis, Santa Fe Springs, Calif.; T. G. Coulson, Hanford, Calif., *Asst. Supts.* S. J. Garrett, *Ch. Chem.* R. W. McCament, *Pur. Agt.* Refineries located at Santa Fe Springs, Calif.; Hanford, Calif.

Canfield Oil Co., The, Cleveland, Ohio
J. A. Jackson, *Pres.* H. M. Carruth, *V. P.* J. R. Nelson, *Sec.* A. L. Bailey, *Treas.* F. J. Van Bergen, *Asst. Sec.* Refineries located at Coraopolis, Pa.; Cleveland, Ohio.

Canton Refining Co., The, Gambrinus Road, P. O. Box 350, Canton, Ohio
W. E. Weidler, *Pres.* M. R. Wiseman, *V. P.* R. S. Blazer, *Sec.* W. E. Weidler, *Treas.* C. L. Wedell, *Gen. Supt. Ref.* W. B. Borst, *Asst. Supt.* Gene Murphy, *Ch. Chem.* Refinery located at Canton, Ohio.

Capitol Crude Oil Co. of Los Angeles, 1020 Subway Terminal Bldg., Los Angeles, Calif.
E. P. Clark, *Pres.* A. E. Smith, *Sec.* Refinery located at Santa Paula, Calif.

Carbide & Carbon Chemicals Corp., South Charleston, W. Va.
J. A. Rafferty, *Pres.* G. O. Curme, Jr., J. G. Davidson, J. W. McLaughlin, H. E. Thompson, R. W. White, *V. P.s.* A. C. Cornell, *Sec.* P. F. Smith, *Treas.* G. B. Landes, *Wks. Mgr.* C. S. Heath, *Gen. Supt. Ref.* W. F. Reich, Jr., *Sales Mgr.* Refinery located at South Charleston, W. Va.

Carpenter, Terry, Inc., Scottsbluff, Neb.
Terry Carpenter, *Pres.* Hazeldean Carpenter, *V. P.* Martha Hillerege, *Sec.* Charles W. Glasby, *Gen. Supt. Ref.* Refinery located at Scottsbluff, Neb.

Carson, M. D. Refining Co., Brady, Tex.
M. D. Carson, *Owner.* Refinery located at Brady, Tex.

Central Oil Co., Glasgow, Ky.
R. B. Tyler, *Pres.* S. C. Harlin, *Gen. Mgr.* Refinery located at Glasgow, Ky.

Centralia Refining Co., Box 464, Centralia, Ill.
A. F. Grohe, *Pres.* R. G. Matthews, *Sec.* and *Treas.* and *Gen. Mgr. Ref.* Jack Stribling, *Gen. Supt. Ref.* Refinery located at Centralia, Ill.

Century Oil Co., 1841 E. Twenty-ninth St., Long Beach, Calif.
E. O. Bachmann, *Pres.* D. S. Jeppson, *V. P.* John G. Bachmann, *Sec.* and *Treas.* C. S. Cox, *Gen. Supt. Ref.* Refinery located at Signal Hill, Calif.

Chadron Refinery, Chadron, Neb.
Refinery located at Chadron, Neb.

Chalmette Petroleum Corp., 1904 American Bank Bldg., New Orleans, La.
B. C. McClellan, *Pres.* D. B. Williams, Charles Leftwich, *V. P.s* R. P. Batson, *Sec.* and *Treas.* J. C. Senter, *Gen. Mgr. Ref.* H. H. Long, *Asst. Supt.* J. C. Senter, *Proc. Supt.* and *Ch. Engr.* Leo P. McCurnin, *Ch. Chem.* V. G. McPherson, *Pur. Agt.* Refinery located at Chalmette, La.

Champlin Refining Co., Enid, Okla.
H. H. Champlin, *Pres.* Joe N. Champlin, *V. P.* D. W. Cotton, *Sec.* and *Treas.* E. J. Slater, *Gen. Mgr. Ref.* L. E. Noble, *Pur. Agt.* Refinery located at Enid, Okla.

Chanute Refining Co., The, Box 431, Chanute, Kans.
R. W. Lind, *Pres.* E. M. Cooper, *V. P.* Ray M. Coder, *Asst. Sec.* and *Treas.* R. W. Lind, *Gen. Supt. Ref.* J. M. Caldwell, *Ch. Chem.* E. M. Cooper, *Pur. Agt.* Refinery located at Chanute, Kans.

Cities Service Oil Co., Bartlesville, Okla.
H. R. Straight, *Pres.* and *Gen. Mgr.* A. W. Ambrose, *V. P.* and *Asst. Gen. Mgr.* C. E. Murray; W. H. Merritt, Chicago; H. D. Frueauff, New York City, *V. P.s.* C. E. Murray, *Sec.* Lloyd A. Lynd, *Asst. Treas.* H. W. Camp, *Gen. Mgr. Ref.* L. D. Mann, *Gen. Supt. Ref.* E. H. Roy, East Chicago; Lee Haugen, Ponca City, *Ref. Supts.* John Snakenberg, East Chicago; Don Eells, Ponca City, *Asst. Supts.* W. W. Scheumann, *Ch. Chem.* Clay Briggs, *Ch. Engr.* Harris Bateman, *Pur. Agt.* Refineries located at Okmulgee, Okla.; Ponca City, Okla.; East Chicago, Ind.

Cities Service Oil Co. (Pennsylvania), 70 Pine St., New York, N. Y.
T. W. Tutwiler, *Pres.* J. S. Cordell, H. D. Fruesuff, C. E. Foster, H. E. Brandli, C. Story, W. W. McFarland, *V. P.s.* E. N. Watkins, *Sec.* W. W. Martin, *Treas.* J. S. Cordell, *Gen. Mgr.* L. M. Bound, *Gen. Supt. Ref.* D. P. Sturges, E. Braintree, Mass.; E. M. Keely, Petty Island, N. J.; C. E. Kinder, Titusville, Pa.; S. K. Keator, Warners (Linden), N. J.; *Ref. Supts.* L. A. Besselman, E. Braintree, Mass.; W. H. Price, Petty Island, N. J.; A. F. Anderson, Titusville, Pa.; H. O. Davis, Warners, N. J., *Asst. Supts.* J. W. Griswold, *Mgr. R. and D.* J. W. Griswold, *Ch. Chem.* C. T. Stanhope, *Ch. Engr.* E. D. Erney, *Pur. Agt.* Refineries located at East Braintree, Mass.; Petty Island, N. J.; Titusville, Pa.; Warners (Linden), N. J.

Clay Refining Co., Arp., Tex.
Dick Duncan, *Pres.* C. W. Curtis, *V. P.* Refinery located at Arp, Tex.

Coastal Petroleum Corp., Mobile, Ala.
John T. Cochrane, Jr., *Pres.* George S. Cochrane, V. P. E. D. Shaffer, *Sec.* R. K. Owen, *Ref. Supt.* Refinery located at Mobile, Ala.

Coastal Refineries, Inc., P. O. Box 1039, Taylor, Tex.
G. L. Rowsey, *Pres.* and *Gen. Mgr.* Ben. H. Harrison, *V. P.* and *Treas.* Harris A. Melasky, *Sec.* S. A. Coleman, *Ch. Chem.* J. L. Sewell, *Supt.* Refinery located at Port Isabel, Tex.

Col-Tex Refining Co., 1000 Ramsey Tower, Oklahoma City, Okla.
L. H. Prichard, *Pres.* J. Steve Anderson, *V. P.* P. H. Anderson, *Sec.* and *Treas.* George H. Burruss, *Gen. Mgr. Ref.* Neal Prichard, *Ref. Supt.* W. M. Sturges, *Pur. Agt.* Refinery located at Colorado, Tex.

Cole Refining Co., 1180 E. Wardlow Road, Seal Beach, Calif.
Refinery located at Seal Beach, Calif.

Coleman Refining Corp., P. O. Box 915, Coleman, Tex.
O. B. Stephens, *Chm. Bd.* Ray McGlothlin, *Pres.* and *Gen. Mgr.* C. I. Powell, *V. P.* M. C. Drummond, *Asst. Supt.* Refinery located at Coleman, Tex.

Colonial Beacon Oil Co., 278 Stuart St., Boston, Mass.
A. Clarke Bedford, *Pres.* C. G. Sheffield, L. E. Ulrope, J. C. Richdale, D. M. Cox, *V. P.s* L. E. Stull, *Sec.* A. F. Whiting, *Treas.* P. C. Shea, *Gen. Mgr. Ref.* William Naden, *Gen. Supt. Ref.* Jeremiah F. Lyons, *Proc. Supt.* John D. Lawler, *Ch. Chem.* Harold L. Bolton, *Ch. Engr.* George E. Clark, *Pur. Agt.* Refinery located at Everett, Mass.

Colorado Oil Refining Co., Denver, Colo.
Refinery located at Denver, Colo.

Concho Refining Co., P. O. Box 79, San Angelo, Tex.
R. D. Lavery, *Pres.* C. B. Mitchell, *Treas.* R. D. Lavery, *Supt.* Refinery located at San Angelo, Tex.

Conewango Refining Co., Warren, Pa.
Harry R. Lewis, *Pres.* C. L. McCarty, *V. P.* I. J. Bergholt, *Sec.* and *Treas.* W. L. Gettings, *Ref. Supt.* K. B. Brogan, *Asst. Supt.* R. E. Dunham, *Mgr. R. and D.* C. W. McConnell, *Ch. Chem.* Paul Broderick, *Pur. Agt.* Refinery located at Warren, Pa.

Consumers Oil & Refining Co., Newcastle, Wyo.
P. N. Fortin, *Pres.* G. L. Culver, *V. P., Treas.* and *Gen Mgr. Ref.* L. B. Hancock, *Sec.* H. G. Martens, *Gen. Supt. Ref.* Refinery located at Newcastle, Wyo.

Continental Oil Co., Ponca City, Okla.
Dan Moran, *Pres.* W. W. Bruce, W. H. Ferguson, Walter Miller, G. F. Smith, R. E. Collom, Harry J. Kennedy, J. G. Dyer, *V. P.s.* James J. Cosgrove, *Sec.* G. F. Smith, *Treas.* Walter Miller, *V. P. Chg. Mfg.* Harold G. Osborn, *Mfg. Mgr.* J. W. Brown, Baltimore, Md., *Ref. Supt.* R. H. Main *(Acting Supt.),* Glenrock, Wyo.; Charles Morgan, Artesia, N. M.; H. H. Kinnaird, Albuquerque, N. M.; Fred G. Fellows, Ponca City, Okla.; D. H. Hyler, Wichita Falls, Tex.; J. P. Markey, Farmington, N. M.; J. E. Fenex, Denver, Colo.; L. L. Smith, Lewistown, Mont., *Ref. Supts.* J. O. Thoen, Ponca City, Okla.; J. A. Ramsey, Wichita Falls, Tex.; W. M. Cocke, Baltimore, Md.; J. A. Mann, Artesia, N. M., *Asst. Supts.* B. H. Lincoln, *Ch. Chem.* M. E. Clawson, *Ch. Engr.* W. H. O'Connor, *Pur. Agt.* Refineries located at Ponca City, Okla.; Baltimore, Md.; Wichita Falls, Tex.; Glenrock, Wyo.; Farmington, N. M.; Artesia, N. M.; Denver, Colo.; Albuquerque, N. M.; Lewistown, Mont.

Continental Refining Co., Rouseville Road, Oil City, Pa.
W. J. Anderton, *Receiver.* I. L. Klein, *Gen. Supt. Ref.* and *Mgr. R. and D.* Eugene Hanna, *Ch. Chem.* J. C. Vogan, *Ch. Engr.* H. Wylie, *Pur. Agt.* Charles H. Thomas, *Sales Mgr.* Refinery located at Oil City, Pa.

Cosco Oil Co., Electric Bldg., Fort Worth, Tex.
J. S. Cosden, *Pres.* and *Treas.* R. O. Wilson, *V. P.* and *Sales Mgr.* J. W. Lane, *Ch. Chem.* B. F. Young, *Pur. Agt.* Joe E. Ernest, *Supt.* Refinery located at Wynnewood, Okla.

Cosden Petroleum Corp., 1700 Electric Bldg., Fort Worth, Tex.
Henry Zweifel, *Chm. Bd.* and *Pres.* Milton C. Zaidenberg, *V. P.* J. W. Lane, *Sec.* and *Treas.* Henry Zweifel, *Gen. Mgr. Ref.* E. W. Potter, *Gen. Supt. Ref.* J. L. Le Bleu, *Asst. Supt.* Harold Bottomley, *Ch. Chem.* Maloy Stevenson, *Ch. Engr.* Ben C. Ammann, *Pur. Agt.* Refinery located at Big Spring, Tex.

Crook County Refinery, Sundance, Wyo.
A. Policky, *Sec.* and *Treas.* and *Pur. Agt.* Joe S. Policky, *Gen. Mgr. Ref.* and *Ch. Chem.* Refinery located at Sundance, Wyo.

Cross, Henry H., Co., 122 S. Michigan Ave., Chicago, Ill.
George F. Fox, *Pres.* O. B. Bingham, Smackover, Ark., *Mgr.* Frank Hovell, Smackover, Ark.; D. L. Crandall, Colmar, Ill.; J. L. McAndrew, Dupo, Ill., *Ref. Supts.* Henry H. Cross Co., *Pur. Agt.* Refineries located at Smackover, Ark.; Colmar, Ill.; Dupo, Ill.

Crown Central Petroleum Corp., American Bldg., Baltimore, Md.
Henry A. Rosenberg, *Pres.* H. S. Lane, *V. P.* James T. B. Bowles, *Sec.* S. K. Waters, *Treas.* S. K. Lawhon, *Asst. Sec.* Karl W. Shimeall, *Gen. Mgr. Ref.* R. S. Myers, *Gen. Supt. Ref.* Jesse Stickel, *Gen. Sales Mgr.* Blaine Johnston, *Supt. Crude Oil Prod.* F. C. Clark, *Traffic Mgr.* David Hutchinson, *Pur. Agt.* Refinery located at Houston, Tex.

Crystal Refining Co. of Carson City, Inc., Carson City, Mich.

G. F. Pratt, *Pres.* E. G. Guy, *V. P.* and *Gen. Mgr* J. G. Fleckenstein, *V. P. in Chg. Sales.* M. A. Hagerman, *Sec.* and *Treas.* C. B. Johnson, *Ref. Supt.* William I. Chamberlin, *Ch. Chem.* Hugh Kobel, *Ch. Treator.* Robert Hallett, *Electrician.* M. A. Hagerman, *Pur. Agt.* Refinery located at Carson City, Mich.

Cushing Refining & Gasoline Co., Box 1111, Cushing, Okla.

R. C. Jones, *Chm. Bd.* and *Pres.* Rex. H. Winget, *V. P.* and *Gen. Mgr. Ref.* M. E. James, *Sec.* and *Treas.* J. H. Hutchinson, *Gen. Supt. Ref.* F. A. Davis, *Asst. Supt.* T. B. Randall, *Ch. Chem.* J. H. Hutchinson, Rex H. Winget, *Pur. Agts.* Refinery located at Cushing, Okla.; Blackwell, Okla.

Cut Bank Refining Co., Cut Bank, Mont.

Kenneth H. Davis, *Pres.* R. C. Tarrant, *V. P.* J. A. Strack, *Sec.* and *Treas.* Kenneth H. Davis, *Gen. Mgr. Ref.* H. A. Lynn, *Gen. Supt. Ref.* Delbert L. Haynes, *Ch. Chem.* Refinery located at Cut Bank, Mont.

D

Danube Oil Corp., Amarillo Bldg., Amarillo, Tex.

Rip C. Underwood, *Chm. Bd.* and *Pres.* Roy E. Lantz, *V. P.* and *Treas.* C. M. Humphrys, *V. P.* Thelma Lea Ketchum, *Sec.* Roy E. Lantz, *Treas.* J. P. Farmer, *Gen. Mgr. Ref.* E. L. Wilson, *Ch. Chem.* F. J. Harper, *Pur. Agt.* Refinery located at Borger, Tex.

Daugherty Refinery, A Division of L. Sonneborn Sons, Inc., 88 Lexington Ave., New York, N. Y.

Dr. F. Sonneborn, *Pres.* J. F. Roten, *V. P.* R. G. Sonneborn, *Sec.* Max Pick, *Treas.* T. M. Murphy, *Mgr.* D. A. Schoerke, *Ch. Engr.* Dr. F. W. Breth, *Ch. Chem.* C. E. McGinnis, *Supt.* Refinery located at Petrolia, Pa.

Deep Rock Oil Corp., Atlas Life Bldg., Tulsa, Okla.

H. N. Greis, *Trustee.* W. E. Moody, *Mgr. Ref.* George Waltershausen, *Supt. Ref.* B. C. Frichot, *Ch. Chem.* R. G. Davis, *Ch. Engr.* R. G. Martin, *Pur. Agt.* Refinery located at Cushing, Okla.

Deloraine Refining Co., Oilmont, Mont.

Henry Vander Pas, Ferdig, Mont., *Pres.* J. M. George, Deloraine, Manitoba, *V. P.* Everett A. Rice, *Sec., Treas.* and *Gen. Mgr.* Refineries located at Oilmont, Mont. and Twin Falls, Idaho.

Denver Producing & Refining Co., 2212 First National Bldg., Oklahoma City, Okla.

R. G. Rapp, *Pres.* H. E. Rapp, *V. P.* Sterling Williams, *Sec.* A. L. Schellhammer, *Treas.* R. G. Rapp, *Gen. Mgr. Ref.* G. A. Mattson, *Ref. Supt.* Robert Mahoney, *Asst. Supt.* Refinery located at Gainesville, Tex.

Derby Oil Co., The, Wichita, Kans.

A. L. Derby, *Chm. Bd.* Carl Fisher, *Pres.* E. C. Moriarity, F. W. McCurry, *V. P.s.* Ernie Wasser, *Sec.* E. C. Claiborne, *Treas.* F. W. McCurry, *Gen. Mgr. Ref.* G. N. Weber, *Ref. Supt.* H. S. Morgan, Burrell Ennis, *Proc. Supts.* Sam. Tihen, *Mgr. R.* and *D.* Proctor Guy, *Pur. Agt.* Refinery located at Wichita, Kans.

Diamond Oil Co., 414 Beneficial Life Bldg., Salt Lake City, Utah.

John Shewell, *Pres.* Harold Shewell, *V. P.* Anna Hill, *Sec.* and *Treas.* C. W. Buskirk, *Ch. Engr.* Refinery located at Virgin, Utah. (Leased to the Baker Petroleum Corp.)

Dilger, F. G., New Castle, Wyo.

F. G. Dilger, *Owner.* Refinery located at Newcastle, Wyo.

Dunlap Refinery, Cat Creek, Mont.

W. F. Dunlap, *Owner.* Refinery located at Cat Creek, Mont.

Dunlap Refinery, Cat Creek, Mont.

W. F. Dunlap, *Owner.* Refinery located at Cat Creek, Mont.

E

Eagle Oil & Refining Co., P. O. Box 763, Santa Fe Springs, Calif.

E. A. Edminston, *Pres.* and *Gen. Mgr.* Refinery located at Santa Fe Springs, Calif.

Eason Oil Co., Bass Bldg., Enid, Okla.

T. T. Eason, *Pres.* and *Gen. Mgr.* L. D. Hinman, *V. P.* T. W. Eason, *Sec.* and *Treas.* P. G. Maranvill, *Gen. Supt. Ref.* W. H. Taft, *Ch. Engr.* G. B. Lyons, *Ch. Chem.* A. C. Hatton, *Pur. Agt.* Refinery located at Enid, Okla.

Eastern States Petroleum Co., Inc., 630 Fifth Ave., New York City, N. Y.

Richard B. Kahle, *Pres.* J. F. McCarthy, L. J. Walsh, Daniel W. Armstrong, B. F. Fallon, *V. P.s.* Daniel W. Armstrong, *Sec.* and *Treas.* B. F. Fallon, *Gen. Mgr.* R. Q. Traweek, *Gen. Supt. Ref.* G. I. Lewis, *Asst. Sec.* and *Treas.* E. W. Patterson, *Ch. Chem.* John Boyles, *Ch. Engr.* Refinery located at Houston, Tex.

East Texas Refining Co., Tower Petroleum Bldg., Dallas, Tex.

F. W. Burford, *Pres.* John J. Thomas, C. C. Herndon, *V. P.s.* W. K. Cottrell, *Sec.* and *Treas.* John J. Thomas, *Gen. Mgr. Ref.* H. H. Knoch, *Ref. Supt.* Milton Hardy, *Ch. Chem.* N. G. Conley, *Ch. Engr.* W. M. Bisett, *Pur. Agt.* Refineries located at Longview, Tex., and Rodessa, La.

East West Refining Co., 1815 E. Soto St., Los Angeles, Calif.

B. F. Alfs, *Pres.* Refinery located at Los Angeles, Calif.

Edington Oil & Refining Co., Ltd., 2800 Cherry Ave., Long Beach, Calif.

C. B. Edington, *Pres.* C. B. Edington, Jr., *V. P.* A. C. Edington, *Sec.* L. A. Foulger, *Gen. Supt. Ref.* Frank Wohlgarmeth, *Ch. Chem.* Refinery located at Signal Hill, Calif.

Eggleston Oil Products Co., Box 186, Three Rivers, Tex.

George B. Eggleston, *Pres.* Joe E. Carroll, Jr., *V. P.* Hal Browne, *Sec.* George B. Eggleston, *Treas.* Roy K. Eggleston, *Gen. Mgr. Ref.* C. L. Rush, *Gen. Supt. Ref.* and *Ch. Chem.* Refinery located at Three Rivers, Tex.

Egyptian Producing & Refining Co., Centralia, Ill.

Perry T. Fess, *Pres.* John Peters, *V. P.* L. L. Urquhart, *Sec.* and *Treas.* and *Pur. Agt.* John Peters, *Plant Supt.* Stephen P. Grady, *Ch. Chem.* Russell Huffman, *Ch. Engr.* Refinery located at Centralia, Ill.

El Camino Refining Co., 3970 Medford St., Los Angeles, Calif.

H. A. Meek, *Chm. Bd.* and *Pres.* J. V. Pohl, *V. P.* E. G. Whitehead, *Sec.* B. E. Devere, *Treas.* and *Gen. Mgr. Ref.* Glen Coiner, *Gen. Supt. Ref.* Refinery located at Los Alamitos, Calif.

El Dorado Refining Co., The, Eldorado, Kans.

Charles G. Yankey, *Pres.* Robert H. Bradford, T. A. Helling, *V. P.s.* George J. Peterschmidt, *Sec.* Robert H. Bradford, *Treas.* T. A. Helling, *Gen. Mgr. Ref.* G. C. Anderson, *Ref. Supt.* H. J. Datin, *Asst. Supt.*

INCREASED EFFICIENCY IN TOWER PACKING

with this New Splined National Carbon *Raschig* Ring

TRADE-MARK

Now available in the popular one inch size

Approximately 25% More Absorption Surface than in a plain 1 inch ring.

These new splined Raschig rings are particularly advantageous for use in comparatively dry towers.

In addition to the splined Raschig rings there are eight standard stock sizes of smooth rings as follows:

¼" ½" ¾" 1" 1¼" 1½" 2" and 3"

"National" Carbon Raschig Rings are all carbon. They contain no soluble bond. They have the advantages of light weight, exceptional strength, high resistance to thermal shock, and long life in the presence of highly corrosive agents.

Surface texture insures complete wetting of the entire ring surface.

● **"National" Carbon Raschig Rings are identified also by the trade-mark "Kemprul"**

"National" Carbon Raschig Rings are showing long life and economy in the following applications.

Reaction and scrubbing towers using highly corrosive agents such as concentrated caustic soda solutions at high temperatures, mixtures of hydrofluoric and phosphoric acids, or of hydrofluoric and sulphuric acids.

Towers in which severe thermal shocks result from sudden changes in temperature.

Rectifying towers, in the rectification of mixtures that are difficult to separate.

Extraction systems, in which maximum interfacial surface is obtained as a result of selective wetting of the carbon rings.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

Carbon Sales Division, Cleveland, Ohio General Offices: 30 E. 42nd St., New York

WRITE FOR YOUR COPY

of this new Vest Pocket Data Book. It contains valuable data on carbon and graphite products.

National Carbon Company, Inc., P. O. Box 6087, Cleveland, Ohio

Gentlemen:

Please send me a copy of the new "National" Vest Pocket Data Book.

*Name*_____ *Position*_____

*Firm*_____ *Address*_____

*City*_____ *State*_____ OG

O. G. Jackson, *Pur. Agt.* Refinery located at Eldorado, Kans.

El Tejon Oil & Refining Corp., Box 993, Bakersfield, Calif.
Gould M. Fitch, *Pres.* Walter J. Meyers, *V. P.* George W. Gill, Jr., *Sec.* and *Treas.* Gould M. Fitch, *Gen. Mgr. Ref.* Joe D. Weedon, *Gen. Supt. Ref.* George W. Gill, Jr., *Ch. Engr.* and *Mgr. R. and D.* B. G. Adams, *Ch. Chem.* J. D. Weedon, *Pur. Agt.* Refinery located at Bakersfield, Calif.

Elk Horn Gas Refinery, Box 464, Osage, Wyo.
Joseph F. Dornacher, *Gen. Mgr. Ref.* and *Pur. Agt* Refinery located at Osage, Wyo.

Elk Refining Co., Kanawha Valley Bldg., Charleston, W. Va.
H. A. Logan, *Pres.* F. G. Bannerot, *V. P.* and *Treas* Fred G. Bannerot, Jr., *Sec.* Robert Burr, *Ref. Supt.* Clarence Hesch, *Asst. Supt.* E. A. Nicholson, *Ch. Chem.* C. E. Kirk, *Ch. Engr.* L. K. Forthman, *Pur. Agt.* Refinery located at Falling Rock, W. Va.

Elm Oil Co., 3328 Elm Ave., Long Beach, Calif.
G. Kindseth, F. Steiner, *Partners.* Fred Steiner, *Gen. Mgr. Ref.* J. A. Novelli, *Pur. Agt.* and *Mgr. R. and D.* A. T. Gredde, *Ch. Chem.* George Greyel, *Ch. Engr.* Refinery located at Long Beach, Calif.

Envoy Petroleum Co., 3000 Walnut Ave., Long Beach, Calif.
A. M. Lockhart, *Pres.* and *Treas.* H. J. Witz, *V. P.* W. S. Wilsey, *Sec.* W. F. Emory, *Gen. Supt. Ref.* W. A. Shaffer, *Ch. Chem.* Refinery located at Long Beach, Calif.

Estado Petroleum Corp., 1358 E. Twenty-third St., Long Beach, Calif.
L. Y. Mattes, *Pres.* H. Hartsock, *Sec.* and *Treas.* E. E. Greiner, *Ref. Supt.* W. B. McColm, *Ch. Chem.* Refinery located at Long Beach, Calif.

Exchange Petroleum Corp., Box 817, Albany, Tex.
A. A. Spencer, *Pres.* and *Gen. Mgr.* I. White, *V. P.* H. A. Spencer, *Sec.* and *Treas.* E. J. White, *Ch. Chem.* C. C. White, *Supt.* Refinery located at Albany, Tex.

Exeter Refining Co., 5843 Paramount Blvd., Long Beach, Calif.
Carl von Bibra, *Chm. Bd.* and *Pres.* Earle F. Demond, *V. P.* and *Treas.* Harold E. Thomas, *Sec.* N. F. Gallucci, *Mgr. Ref.* John Klein, *Ch. Chem.* N. F. Gallucci, *Pur. Agt.* Refinery located at Long Beach, Calif.

F

Fabrico Refining Co., Inc., Bandini, Calif.
Refinery located at Bandini, Calif.

Falcon Refining Co., The, Great Bend, Kans.
Henry Dickason, *Pres.* R. W. Morris, *V. P.* and *Sec.* Henry Dickason, *Treas.* R. W. Russell, *Gen. Supt. Ref.* August Weidie, *Asst. Supt.* Cliford Wise, *Ch. Chem.* C. S. Dickason, *Pur. Agt.* Refinery located at Great Bend, Kans.

Falls Refining Co., Inc., P. O. Box 508, Wichita Falls, Tex.
J. E. Parker, *Pres.* H. T. Parker, *V. P.* Refinery located at Wichita Falls, Tex.

Farmers Refinery, The, P. O. Box 372, Lubbock, Tex.
B. B. Walker, *Pres.* Lina F. Walker, *Sec.* and *Treas.* Refinery located at Lubbock, Tex.

Field, O. C., Gasoline Corp., P. O. Box 7, Casmalia, Calif.
R. B. Hale, *Chm. Bd.* O. C. Field, *Pres.* J. C. Burks, W. G. Metson, *V. P.s.* Newton J. Hale, *Sec.* and *Treas.* A. C. Young, *Ref. Supt.* Refinery located at Casmalia, Calif.

Five C Refining Co., Santa Maria, Calif.
Refinery located at Santa Maria, Calif.

Franklin Creek Refining Corp., 88 Lexington Ave., New York, N. Y.
Dr. Ferdinand Sonneborn, *Pres.* J. F. Roten, *V. P.* A. R. Hudgins, *Treas.* Refinery located at Los Angeles, Calif.

Fredonia Oil & Refining Co., P. O. Box 63, Fredonia, Kans.
D. W. Crumley, Chanute, Kans., *Pres.* Mrs. Helen Daugherty, Topeka, Kans., *V. P.* Raymond Justice, *Sec.* and *Gen. Mgr.* Ira Dozier, *Gen. Supt.* Refinery located at Fredonia, Kans.

Freedom Oil Co., Freedom, Pa.
Earle M. Craig, *Pres.* and *Treas.* William G. Bechman, *V. P.* and *Sec.* B. L. Heath, *Gen. Supt. Ref.* A. M. Crittenden, *Ch. Chem.* G. J. Mohr, *Pur. Agt.* Refinery located at Freedom, Pa.

Frontier Fuel Oil Corp., Ellicott Square, Buffalo, N. Y.
J. F. Breuil, *Pres.* Clinton H. Lathrop, Warren Mundie, *V. P.s* W. H. Bennett, *Sec.* and *Treas.* Mayfield Sumpter, *Gen. Supt. Ref.* W. C. Maier, *Pur Agt.* Refinery located at Buffalo, N. Y.

G

Gallatin Valley Co-Operative Co., Belgrade, Mont.
Refinery located at Belgrade, Mont.

Gallup City Refinery, Gallup City, Mont.
Refinery located at Gallup City, Mont.

General Petroleum Corp. of California, 108 W. Second St., Los Angeles, Calif.
A. L. Weil, *Pres.* R. A. Sperry, B. E. Parsons, S. J. Dickey, A. H. DeFriest, E. L. Adams, *V. P.s* D. W. Woods, *Sec.* W. Cunningham, *Treas.* S. J. Dickey, *Mgr. Mfg.* A. H. DeFriest, *Sales Mgr.* V. F. Grace, *Mgr. Engr. Dept.* G. F. Olsen, *Mgr. Labs.* E. W. Beck, *Pur. Agt.* Fred Isaacs, Vernon, Calif., and Torrance, Calif.; R. C. Wheeler, Lebec, Calif., *Supts.* Refineries located at Torrance, Calif.; Vernon, Calif.; Lebec, Calif.

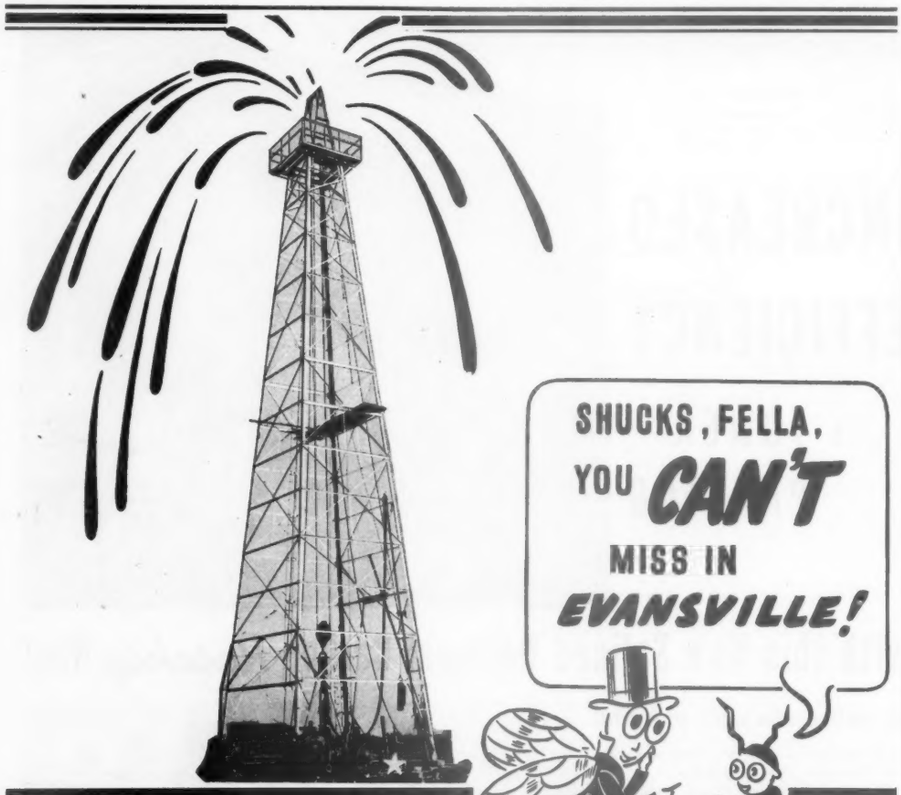
Gillette Refining Co., Box 761, Sheridan, Wyo.
V. C. Langford, *Pres.* C. I. Greene, *Sec.* and *Treas.* Refinery located at Gillette, Wyo.

Gilmore Oil Co., 2423 E. Twenty-eighth St., Los Angeles, Calif.
E. B. Gilmore, *Pres.* C. S. Beesemyer, *V. P.* S. M. Salisbury, *Sec.* J. L. Coates, *Treas.* H. L. Eggleston, *Gen. Mgr. Ref.* and *Mgr. R* and *D.* H. E. Marsh, Vernon plant at Los Angeles, Calif.; Perry Vandervoort, Roadamite plant at Santa Maria, Calif. *Ref. Supts.* R. H. Pierson, *Ch. Chem.* E. L. Tobias *Ch. Engr.* D. H. F. MacPherson, *Pur. Agt.* Refineries located at Los Angeles, Calif.; Santa Maria, Calif.

Glacier Production Co., Cut Bank, Mont.
Refinery located at Cut Bank, Mont.

Globe Oil & Refining Co. (Kansas), The, Union National Bank Bldg., Wichita, Kans.
I. A. O'Shaughnessy, *Pres.* F. L. Jehle, *V. P.* and *Gen. Mgr.* J. F. O'Shaughnessy, *Sec.* and *Treas.* E. J. Mary, McPherson, Kans., *Ref. Supt.* C. R. Berger, *Ch. Chem.* E. J. Mary, *Ref. Pur. Agt.* Refinery located at McPherson, Kans.

Globe Oil & Refining Co. (Kansas), The, Union National Bank Bldg., Wichita, Kans.
I. A. O'Shaughnessy, *Pres.* F. L. Jehle, *V. P.* and



Take a tip from a "DOODLE BUG!"

If you're looking for new opportunities—here they are! The experience of 21 leading oil companies and a score of well-known oil equipment supply firms who have moved in during the past six months bears out what the "doodle-bug" says—YOU CAN'T MISS IN EVANSVILLE!

EVANSVILLE INDIANA
"The Capital of Three Oil Fields"

Its strategic location makes it the capital city of the Tri-State's oil proven territory. Its resources, facilities, and modern accommodations, its hospitality and co-operation, make it the logical headquarters for your operations. Come and take advantage of the opportunities awaiting you in Evansville!

FOR DETAILED INFORMATION WRITE, WIRE OR PHONE

Evansville CHAMBER of COMMERCE

Gen. Mgr. Ref. E. A. Lentz, *Sec.* and *Treas.* R. D. McCrum, Blackwell, Okla., *Ref. Supt.* and *Ref. Pur. Agt.* Refinery located at Blackwell, Okla.

Globe Oil & Refining Co. (Illinois), The, 1300 Union National Bank Bldg., Wichita, Kans.

I. A. O'Shaughnessy, *Pres.* F. L. Jehle, *V. P.* and *Gen. Mgr. Ref.* G. G. Woodruff, *Treas.* H. B. Overton, Lemont, Ill., *Ref. Supt.* W. F. Krause, *Ch. Chem.* R. A. Fox, *Ch. Engr.* H. B. Overton, *Ref. Pur. Agt.* Refinery located at Lemont, Ill.

Golden Bear Oil Co., 325 W. Eighth St., Los Angeles, Calif.

S. R. Roseberg, *Chm. Bd.* J. M. Feldman, *Pres.* Charles P. Prewett, *V. P.* and *Gen. Mgr. Ref.* Louis L. Swarthe, *Sec.* and *Treas.* M. B. Pardew, *Gen. Supt. Ref.* Charles P. Prewett, *Pur. Agt.* Refinery located at Oildale, Calif.

Golden Rule Oil Co., 120 W. First St., Wichita, Kans.

Elbert S. Rule, *Pres.* and *Gen. Mgr.* Mildred Rule Olson, *V. P.* Roy E. Stewart, *Sec.* and *Treas.* Refinery located at North Wichita, Kans.

Gordon Refining Co., Gordon, Neb.

William F. Hewett, *Owner.* Kenneth French, *Gen. Mgr. Ref.* Refinery located at Gordon, Neb.

Goshen Oil & Refining Co., Torrington, Wyo.

Refinery located at Torrington, Wyo.

Gratex Refining Co., Box 307, Graham, Tex.

E. R. Marchman, *Gen. Mgr. Ref.* and *Pur. Agt.* Claud Humphrey, *Gen. Supt. Ref.* Refinery located at Graham, Tex.

Gray Refinery, Inc., Newcastle, Wyo.

D. O. Gray, *Pres.* P. T. McAvoy, *Sec.* E. M. Gray, *Treas.* W. D. Gray, *Gen. Supt. Ref.* Refinery located at Newcastle, Wyo.

Gulf Oil Corp. and Gulf Refining Co., P. O. Box 1166, Pittsburgh, Pa.

W. L. Mellon, *Chm. Bd.* (Gulf Oil Corp.). J. F Drake, *Pres.* F. A. Leovy, *V. Chm. Bd.* (Gulf Oil Corp.), and *Chm. Bd.* (Gulf Refining Co.). H. A. Gidney, *V. P.* and *Comptroller.* David Proctor, *Sec.* J. E. Nelson, *V. P.* and *Treas.* William A. Slater, *Gen. Mgr. Ref.* T. J. Sullivan, *Asst. Gen. Mgr. Ref.* B. H. Barnes, *Gen. Supt. in Texas.* G. I. Roberts, Port Arthur, Tex.; H. Taylor, Fort Worth, Tex.; J. W. Schriever, Sweetwater, Tex., *Asst. Supts.* H. V. Sanderson, *Mgr.*, Staten Island, N. Y. William Braybrooks, *Supt.*, Staten Island, N. Y. W. M. Crockett, *Supt.*; J. E. Biggins, *Asst. Supt.*, Philadelphia, Pa. J. O. Timms, *Supt.*; J. H. Wackenhut, *Asst. Supt.*, Pittsburgh, Pa. R. C. Faulkner, *Supt.*; D. E. Hart, *Asst. Supt.*, Toledo, Ohio. T. J. Twomley, *Supt.*; A. A. Niehenke, *Asst. Supt.*, Cleves, Ohio. H. G. Smith, *Mgr. Ref. Tech. Div.* Herbert Henderson, *Mgr. Eng. and Constr.* Donald G. Clark, *Director of Purchases.* Gulf Oil Corp. refineries located at Port Arthur, Tex.; Fort Worth, Tex.; Sweetwater, Tex.; Staten Island, N. Y.; Philadelphia, Pa.; Pittsburgh, Pa. Gulf Refining Co. refineries located at Toledo, Ohio; Cincinnati, Ohio.

H

Hancock Oil Co. of California, The, 2828 Junipers Ave., Long Beach, Calif.

Will J. Reid, *Pres.* G. P. Dease, *1st V. P.* E. E. Pyler, *V. P. Prod.* John W. Hancock, *Sec.* W. T. Hancock, *Treas.* and *Gen. Supt. Ref.* W. Westergard, *Pur. Agt.* Refinery located at Long Beach, Calif.

Hannah-Porter Co., Border Field, Mont.

Refinery located at Border Field, Mont.

Harbor Refining Co., Inc., 2240 South St., Long Beach, Calif.

H. A. McOwen, *Pres.* and *Gen. Mgr.* D. D. Dunlap, O. M. Slosson, *V. P.s.* C. E. Duke, *Sec.* Harold Beckley, *Gen. Supt. Ref.* Refinery located at Long Beach, Calif.

Hawley, Ted, Conrad, Mont.

Ted Hawley, *Owner* and *Operator.* Refinery located at Conrad, Mont.

Hightower Oil & Refining Corp., P. O. Box 830, Brownwood, Tex.

James A. Watt, *Pres.* Alexander W. Watt, *V. P.* H. W. Greenwood, *Sec.* and *Treas.* Stanley R. Folkins, *Gen. Mgr. Oper.* Clyde Stuart, *Gen. Supt. Oper.* S. R. Folkins and Clyde Stuart, *Pur. Agt.* Refinery located at Brownwood, Tex.

Hill Refining Co., Ballinger, Tex.

Roy L. Hill, *Sole Owner.* Refinery located at Ballinger, Tex.

Hole Bros. Refinery, Cut Bank, Mont.

B. V. Hole, S. A. Hole, I. M. Hole, *Partnership.* S. A. Hole, B. V. Hole, *Gen. Mgrs. Ref.* I. M. Hole, *Gen. Supt. Ref.* Refinery located at Cut Bank, Mont.

Home Oil & Refining Co., Great Falls, Mont.

W. E. Rice, *Pres.* John Rice, *V. P.* and *Gen. Mgr. Ref.* Fred Erickson, *Sec.* and *Treas.* Garrett Hoback, *Ref. Supt.* Vernon May, *Ch. Chem.* Marvin Jenkins, *Ch. Engr.* Fred Erickson, *Pur. Agt.* Refinery located at Great Falls, Mont.

Hot Springs Refining Co., Hot Springs, S. D.

E. M. Wells, *Pres.* and *Gen. Mgr. Ref.* E. M. Foster *V. P.* C. M. Wells, *Sec.* and *Treas.* Refinery located at Hot Springs, S. D.

Houston Oil Co. of Texas, P. O. Box 2412, Houston, Tex.

George A. Hill, Jr., *Pres.* L. S. Zimmerman, Baltimore, Md., *V. P.* and *Treas.* A. H. Kennerly, *Sec.* R. R. Hobson, *Gen. Mgr.* F. Y. Hutchison, *Ch. Engr.* George H. Hartung, *Ref. Supt.* R. H. Cook, *Ch. Chem.* O. S. Cummings, *Pur. Agt.* Refinery located at Viola, Tex.

Howard County Refining Co., Big Spring, Tex.

R. T. Piner, *Pres.* Joseph Edwards, *V. P.* and *Gen. Mgr. Ref.* G. H. Hayward, *Sec.* and *Treas.* Seth Wehunt, *Ref. Supt.* J. Henry Edwards, *Sales Mgr.* and *Pur. Agt.* Refinery located at Big Spring, Tex.

Humble Oil & Refining Co., Box 2180, Houston, Tex.

R. L. Blaffer, *Chm. Bd.* H. C. Wiess, *Pres.* James Anderson, E. E. Townes, John R. Suman, L. T. Barrow, *V. P.s.* R. L. Blaffer, H. C. Wiess, E. E. Townes, James Anderson, John R. Suman, L. T. Barrow, Hines H. Baker, S. A. Giraud, *Directors.* James S. Crate, *Sec.* R. L. Blaffer, *Treas.* S. A. Giraud, *Gen. Mgr. Ref.* G. L. Farned, Baytown, Tex.; H. F. Goss, Ingleside, Tex.; C. M. Bell, San Antonio, Tex.; C. M. Dennison, Neches, Tex., *Ref. Supts.* James Harrop, Baytown, Tex.; W. H. Barber, Ingleside, Tex.; E. Sealy, San Antonio, Tex.; M. L. Snyder, Baytown, Tex., *Asst. Supts.* H. D. Wilde, Jr. *Mgr. R. and D.* S. S. Shaffer, *Ch. Chem.* Dr. E. F. Voss, *Ch. Engr.* F. A. Watts, *Pur. Agt.* Refineries located at Baytown, Tex.; Ingleside, Tex.; So. San Antonio, Tex.; Neches, Tex.

Hunt, Eugene, Winnett, Mont.

Eugene Hunt, *Owner.* Ed Korwald, *Gen. Mgr. Ref.* Refinery located at Winnett, Mont.

Hurricane Petroleum Corp., First National Bank Bldg., Shreveport, La.

M. J. Grogan, *Pres.* B. P. Crittenden, *V. P.* and *Gen. Mgr.* H. T. McGown, *Sec.* T. H. Grobe, *Treas.* J. A. O'Neill, *Gen. Supt.* J. W. Jordon, Overton, Tex.; R. B. McCall, Arp, Tex., *Supts.* A. R. Schaenagel, *Ch. Chem.* J .W. Jordon, *Ch. Engr.* O. F. Shaver, *Pur. Agt.* Refineries located at Overton and Arp, Tex.

Husky Refining Co., Cody, Wyo.

Glenn E. Nielson, *Pres.* H. O. Batzer, *V. P.* and *Gen. Mgr.* H. W. Batzer, *Sec.* and *Treas.* J. B. Kimes, *Gen. Supt. Ref.* Joe Faulkner, *Mgr. R. and D.* K. E. Dyer, *Ch. Chem.* J. H. Shepard, *Ch. Engr.* and *Pur. Agt.*

I

Idaho Refining Co., Box 767, Pocatello, Idaho.

William H. McIntyre, Jr., *Pres.* Henry D. Moyle, *V. P.* Arch G. Webb, *Sec.* John H. Peterson, *Treas.* Don F. Gerstenberger, *Gen. Supt. Ref.* Glen H Kinnick, *Ref. Supt.* E. V. Smith, *Asst. Supt.* G. L. Farnsworth, *Ch. Chem.* Refinery located at Pocatello, Idaho.

Illinois Oil Co., Rock Island, Ill.

Frank P. Welch, *Pres.* and *Gen. Mgr.* J. W. Armstrong, *V. P.* F. R. Edwards, *Sec.* and *Treas.* P. J. Glover, *Gen. Supt. Ref.* F. R. Edwards, *Pur. Agt. of Bulk Sta.* P. J. Glover, *Pur. Agt. of Refinery.* W. W. Kelly, *Supt.* Refinery located at Cushing, Okla.

Imperial Refining Co., P. O. Box 104, Michigan Road, N.E., Grand Rapids, Mich.

F. S. Grimes, *Pres.* and *Gen. Mgr.* William C. Vandenberg, *V. P.* Morton Keeney, *Sec.* A. D. Crimmins, *Treas.* Glen Hobson, *Gen. Supt. Ref.* G. A. Young, *Pur. Agt.* Refinery located at Grand Rapids, Mich.

Independent Refining Co., Laurel, Mont.

W. E. Rice, *Pres.* D. E. Hageman, *V. P.* and *Treas.* H. J. Coleman, *Sec.* C. A. Cromwell, *Ref. Supt.* J. M. Williams, *Ch. Chem.* W. H. Tolhurst, *Ch. Engr.* P. A. Thomson, *Pur. Agt.* Refinery located at Laurel, Mont.

Indian Refining Co., Lawrenceville, Ill. (Subsidiary of Texas Corp.).

W. S. S. Rodgers, New York City, *Pres.* P. C. Scullin; H. W. Dodge, New York City; W. Hochuli, Chicago, Ill.; S. B. Wright, New York City, *V. Ps.* R. L. Saunders, New York City, *Sec.* C. E. Woodbridge, New York City, *Treas.* C. E. Olmsted, New York City, *V. P. Ref. Dept.* J. S. Worden, *Supt. Ref.* A. F. Colling, New York City, *Mgr. Pur. Dept.* Refinery located at Lawrenceville, Ill.

Inland Empire Refineries, Inc., Spokane, Wash.

Wm. H. McIntyre, Jr., *Pres.* Henry D. Moyle, *V. P.* D. S. Bennien, *Sec.* W. J. Doherty, *Asst. Treas.* D. F. Gerstenberger, *Gen. Mgr. Ref.* A. G. Coppins, *Ref. Supt.* Irving S. Smith, *Sales Mgr.* Rex Gleave, *Ch. Chem.* Refinery located at Spokane, Wash.

Inter-Lakes Refining Co., Flat Rock, Mich.

West H. Gallogly, *Pres.* and *Treas.* Edward H. Yost, *V. P.* and *Sec.* James Pokorney, *Gen. Mgr.* and *Supt. Ref.* Refinery located at Flat Rock, Mich.

Interstate Oil Corp., Taft, Calif.

F. B. Gormley, *Receiver.* Refinery located at Taft, Calif.

J

Jacksboro Refining Co., Jacksboro, Tex.

F. W. Kendrick and A. T. Gray, *Owners.* Refinery located at Jacksboro, Tex.

Johnson, A. L., Wayne, Ohio

A. L. Johnson, *Owner.* Refinery located at Wayne, Ohio.

Johnson Oil Refining Co., 20 N. Wacker Drive, Chicago, Ill.

James J. Johnson, *Chm. Bd.* I. H. Johnson, *Pres.* L. Ralph Johnson *V. P.* and *Gen. Mgr.* G. C. Lilly, *Sec.* J. O. Horton, *Treas.* W. J. Leenhouts, *Ref. Supt.* R. B. Fowler, *Asst. Supt.* F. V. Frey, *Ch. Chem.* V. C. Goward, *Pur. Agt.* Refinery located at Cleveland, Okla.

Joplin Refining Co., Joplin, Mo.

Joseph F. Jones, *Gen. Mgr.* and *Pur. Agt.* Richard O'D. Jones, *Ch. Engr.* Refinery located at Joplin, Mo.

K

Kanotex Refining Co., The, Arkansas City, Kans.

C. M. Boggs, *Pres.* W. L. Lesh, *V. P.* E. K. Childers, *Sec.* R. R. Cox, *Treas.* F. A. Deering, *Ref. Supt.* C. F. Wakefield, *Asst. Supt.* Guy S. Kirk, *Ch. Chem.* Dodson Gwens, *Ch. Engr.* L. E. Watts, *Pur. Agt.* Refinery located at Arkansas City, Kans.

Kendall Refining Co., 77 N. Kendall Ave., Bradford, Pa.

Otto Koch, *Pres.* J. B. Fisher, *Ex. V. P.* J. H. Bovaird, *V. P.* J. B. Fisher, *Sec.* Otto Koch, *Treas.* W. B. McCluer, *Gen. Mgr. Ref.* and *Ch. Chem.* E. E. Bown, *Gen. Supt. Ref.* F. J. Healy, E. V. Kelly, *Ref. Supts.* S. M. Wolbert, *Ch. Engr.* F. W. Wodrich, *Pur. Agt.* Refinery located at Bradford, Pa.

Kent Refining Co., Corsicana, Tex.

L. M. Fauber, *Gen. Mgr. Ref.* and *Pur. Agt.* Refinery located at Angus, Tex.

Keystone Oil Refining Co., 12800 Northampton, Detroit, Mich.

William Fisher, *Pres.* and *Treas.* Nathan R. Epstein, *V. P.* Leon Komisaruk, *Sec.* and *Gen. Mgr.* William Fisher, *Treas.* and *Pur. Agt.* William H. Osborn, *Gen. Supt.* and *Ch. Engr.* Joseph Cochin, *Ch. Chem.* Refinery located at Detroit, Mich.

Knox Refining Co., Drawer 942, Enid, Okla.

Charles E. Knox, *Owner.* Roy E. Raemer, *Gen. Mgr.* and *Pur. Agt.* C. D. West, *Gen. Supt. Ref.* Refinery located at Covington, Okla.

Kolingo Refining Co., Box 636, Coalinga, Calif.

W. R. Harper, *Chm. Bd.* and *Pres.* J. I. Clark, *V. P.* Albert H. Collins, *Sec.* and *Treas.* A. H. Collins, San Francisco, Calif., *Gen. Mgr. Ref.* James E. Cox, *Ref. Supt.* Refinery located at Coalinga, Calif.

Krieger Oil Co. of California, 325 E. Compton Blvd., Clearwater, Calif. (Copartnership).

I. G. Krieger, *Gen. Mgr. Ref.* L. G. Haworth, *Gen Supt. Ref.* and *Ch. Engr.* V. R. Marichal, *Mgr. R. and D.* and *Pur. Agt.* M. Litzinger, *Ch. Chem.* Refinery located at Clearwater, Calif.

L

Lacy, R., Refinery, Box 591, Kilgore, Tex.

R. Lacy, *Owner.* A. S. Robertson, *Gen. Mgr. Ref.* and *Pur. Agt.* George H. Burrow, *Gen. Supt. Ref.* J. H. Burrow, *Asst. Supt.* R. Dublin, *Ch. Chem.* Refinery located at Kilgore, Tex.

Lake-Price Refineries, Inc., P. O. Box 146, Shreveport, La.

J. A. Lake, Jr., *Pres.* C. R. Lake, *V. P.* and *Gen. Mgr.* N. R. Price, *Sec.* and *Gen. Supt. Ref.* C. R. Lake, *Treas.* and *Pur. Agt.* C. J. Pollard, *Asst. Supt.* R. E. Harris, *Ch. Chem.* Refinery located at Princeton, La.

Lake View Oil & Refining Co., 1123 Rowan Bldg., Los Angeles, Calif.

B. J. Bradner, *Receiver.* A. J. Rehwold, *V. P.* C. Dower, *Gen. Mgr. Ref.* Refinery located at Maricopa, Calif.

La Salle Petroleum Co., 612 Wright Bldg., Tulsa, Okla.

W. J. Schnur, Tulsa, Okla., and Phil D. Williams, Burkburnett, Tex., *Receivers.* Phil D. Williams, *Gen. Mgr. Ref.* Roger K. Kolter, *Mgr. R. and D.* Refinery located at Burkburnett, Tex.

Leonard Refineries, Inc., Alma, Mich.

J. W. Leonard, Jr., *Pres.* Reid Brazell, B. M. Jones, *V. P.s.* B. M. Jones, *Sec.* Reid Brazell, *Gen. Mgr.* and *Pur. Agt.* R. W. Pollard, Alma, Mich.; E. F.

Sondregger, St. Louis, Mich., *Ref. Supts.* M. D. Vanderley, *Sales Mgr.* L. R. Kamperman, *Mgr. Bulk Sales.* W. R. Creger, *Ch. Chem.* Refineries located at Alma and St. Louis, Mich.

Lima Crude Refining Co., 122 W. Front St., Findlay, Ohio

H. C. Goff, *Pres., Treas.* and *Gen. Mgr.* D. H. Pond, *V. P.* H. W. Stafford, *Sec.* E. A. O'Neil, *Gen. Supt. Ref.* J. A. Fischer, *Ch. Chem.* Refinery located at Findlay, Ohio.

Lion Oil Refining Co., Exchange Bldg., El Dorado, Ark.

Col. T. H. Barton, *Pres.* R. M. Martin, J. J. Allinson, J. E. Howell, A. F. Reed, *V. Ps.* Jeff Davis, *Sec.* R. E. Meinert, *Treas.* and *Pur. Agt.* J. J. Allinson, *Gen. Mgr. Ref.* J. W. Poole, *Asst. Gen. Mgr. Ref.*; F. B. Stamper, *Process Supt.* W. T. Evans, *Asst. Process Supt.* C. C. Wilch, *Mgr. R. and D. (Lube Oil).* F. R. Grant, *Mgr. R. and D. (Asphalt).* W. M. Carney, *Ch. Chem.* D. J. Kreager *Ch. Engr.* Refinery located at El Dorado, Ark.

Los Nietos Producing & Refining Co., Ltd., 714 W. Olympic Blvd., Los Angeles, Calif.

Refinery located at Kettleman Hills, Calif.

Louisville Refining Co., 411 American Life Bldg., Louisville, Ky.

Eli H. Brown, Jr., *Pres.* H. R. Smith, *Sec.* and *Treas.* J. J. Loudermill, *Ref. Supt.* A. R. Green, *Ch. Chem.* L. E. Griffith, *Ch. Engr.* W. A. Waples, *Pur. Agt.* Refinery located at Louisville, Ky.

Lube Oil Corp., Alma, Mich.

R. B. Smith, *Chm. Bd.* G. F. Chase, *Pres.* H. F. Alexander, *V. P.* W. K. Graham, *Sec.* and *Treas.* Refinery located at Alma, Mich., under lease to Trumbull Asphalt & Refining Co., Chicago, Ill.

Mc

McCallen Refining Co., Seventeenth & Garfield Sts., P. O. Box 550, Huntington Beach, Calif.

M. M. McCallen, *Pres.* and *Gen. Mgr.* J. T. Africa, *Sec.* and *Pur. Agt.* Refinery located at Huntington Beach, Calif.

McGarr Petroleum Corp., P. O. Box 56, Kline, Colo.

G. M. McGarr, *Pres.* and *Gen. Mgr.* A. L. Kroeger, *V. P.* Ruth Z. Brazil, *Sec.* and *Treas.* Refinery located at Kline, Colo.

McMurrey Petroleum Corp., Peoples Bank Bldg., Tyler, Tex.

M. H. McMurrey, *Pres.* V. E. Crawford, *Ch. Chem.* A. L. Cone, *Pur. Agt.* Fred P. Sewell, *Supt.* Refinery located at Tyler, Tex.

McNutt Oil & Refining Co., P. O. Box 1161, El Paso, Tex.

C. M. McNutt, C. E. McNutt, C. Blaine McNutt, J. T. McNutt, *Co-Partnership.* Cecil E. McNutt, *Gen. Mgr* Glen E. Cord, Charles Witz, O. B. Powell, *Asst. Supts.* Blaine McNutt, *Pur. Agt.* Refinery located at Brickland, N. M.

Malco Refineries, Inc., Artesia, N. M.

M. E. Barsh, *Pres.* L. R. Simon, *V. P.* and *Gen. Mgr.* and *Supt.* R. A. Shugart, *Sec.* and *Treas.* C. A. Baker, *Asst. Supt.* A. C. Sturgis, *Mgr. R. and D.* and *Ch. Chem.* R. A. Shugart, *Pur. Agt.* Refinery located at Artesia, N. M.

M

M & M Refining Co., Fort Morgan, Colo.

E. G. Markley, *Pres.* and *Gen. Mgr.* H. C. Woodin, *V. P.* and *Treas.* Refinery located at Fort Morgan, Colo.

Macmillan Petroleum Corp., 530 W. Sixth St., Los Angeles, Calif.

R. S. Macmillan, *Pres.* and *Chm. Bd.* H. R. Macmillan, S. M. Batterson, M. P. Macmillan, H. E. Boner, *V. Ps.* DeWitt Knox, *Sec.-Treas.* H. E. Boner, *Gen. Mgr. Ref.* W. H. Powell, Long Beach, Calif.; L. L. Rebber, El Dorado, Ark., *Ref. Supts.* S. E. Campbell, *Ch. Chem.* C. C. Benz, *Ch. Engr.* Refineries located at Borger, Tex.; El Dorado, Ark.; Long Beach, Calif.

Magnolia Petroleum Co., P. O. Box 900, Dallas, Tex.

E. R. Brown, *Chm. Bd.* D. A. Little, *Pres.* L. S. Sinclair, *V. P.* G. L. Tate, *Sec.* W. L. Holmes, *Treas.* J. W. Newton, *V. P. Chg. Ref.* R. R. Jackson, Beaumont, Tex.; John Ricker, Fort Worth, Tex.; C. S. Dickens, Corsicana, Tex.; J. T. Dickens, Luling, Tex., *Ref. Supts.* T. E. Schley, Beaumont, Tex.; N. B. Marchbanks, Fort Worth, Tex.; A. L. Hardy, Luling, Tex., *Asst. Supts.* P. L. Smith, *Ch. Chem.* C. A. Knight, *Ch. Engr.* E. W. Gross, *Pur. Agt.* Refineries located at Beaumont, Tex.; Fort Worth, Tex.; Corsicana, Tex.; Luling, Tex.

Maguire Oil & Refining Co., Santa Maria, Calif.

Refinery located at Santa Maria, Calif.

Majestic Refining Co., Inc., P. O. Box 165, Dale, Tex.

Booth Oldham, *Pres.* J. Morris Oldham, *V. P., Sec.* and *Treas., Pur. Agt.,* and *Gen. Mgr.* R. E. Goode, *Gen. Supt.* Williamson G. Browning, *Ch. Chem.* Refinery located at Dale, Tex.

Mangold & Tweedy Refining Co., Long Beach, Calif.

Refinery located at Long Beach, Calif.

Maritime Oil Co., Houston, Tex.

L. F. Rothermel, *Pres.* W. G. Rothermel, *V. P.* W. E. Glenn, *Sec.* and *Treas.* H. L. M'Mememy, *Gen. Mgr.* Refinery located at Houston, Tex.

Master Petroleum Co., Waco, Tex.

Carl Casey, *Pres.* Floyd Casey, *Sec.* Refinery located at Waco, Tex.

Mercury Petroleum Corp., P. O. Box 71, Venice, Calif.

H. H. Biber, *Pres.* and *Gen. Mgr.* D. E. Biber, J. M. Stump, *V. P.s.* D. E. Biber, *Sec.* and *Treas.* C. H. Lack, *Ref. Supt.* D. E. Brown, *Sales Mgr.* and *Pur. Agt.* H. H. Biber, *Ch. Chem.* Refinery located at Venice, Calif.

Mertzon Refining Co., Corsicana, Tex.

J. T. Eady, *Mgr.* Refinery located at Mertzon, Tex.

Mexican Petroleum Corp. of Georgia, 122 E. Forty-second St., New York, N. Y.

E. G. Seubert, *Chm. Bd.* Robert E. Wilson, *Pres.* E. G. McKeever, D. J. Smith, J. A. Carroll, Jr., *V. P.s.* D. H. Baker, *Sec.* J. A. Carroll, Jr., *Treas.* D. J. Smith, *Gen. Mgr. Ref.* H. T. Hulin, *Ref. Supt.* J. A. Whitely, *Pur. Agt.* Refinery located at Savannah, Ga.

Mid-Continent Petroleum Corp., Cosden Bldg., Tulsa, Okla.

Jacob France, *Chm. Bd.* and *Pres.* E. M. Rouzer, J. C. Denton, G. O. Moody, F. B. Koontz, R. W. McDowell, Jess Scarborough, *V. P.s* E. M. Rouzer, *Sec.* Charles Klein, *Treas.* F. B. Koontz, *Gen. Mgr. Ref.* D. G. Morgan, *Gen. Supt. Ref.* H. T. Bennett, *Mgr. R.* and *D.* and *Ch. Chem.* C. A. Prichard, *Pur. Agt.* Refinery located at West Tulsa, Okla.

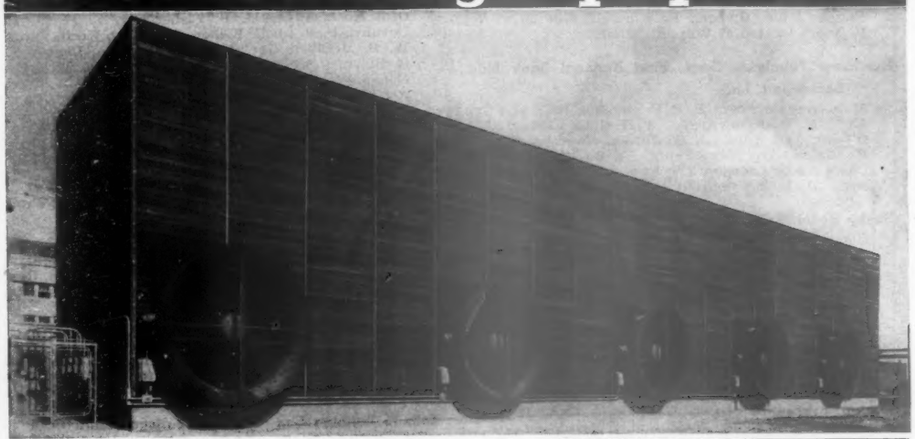
Midland Oil Refining Co., 2300 Clermont St., Denver, Colo.

L. M. Hines, *Pres.* and *Gen. Mgr.* L. R. Hines, *Sec.* and *Treas.* Refinery located at Denver, Colo.

Midland Refining Co., Midland, Neb.

Refinery located at Midland, Neb.

MARLEY *the COMPLETE Line of* Water Cooling Equipment



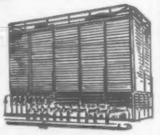
New Models at New Savings!

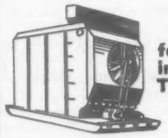
The Marley line for 1939 offers the accumulated advantages of the longest and broadest experience at building heat-transfer equipment plus important features developed during 1938 by a veteran research and engineering staff. Yet prices have been reduced.

The wide diversity of types, a few of which are shown here, permits the efficient, economical solution of any water cooling problem. It will pay you to call in your nearest Marley engineer whatever your needs may be.

FORCED DRAFT TOWERS
For Refineries, Natural Gasoline Plants, Etc.

INDUCED DRAFT TOWERS
For Gas Compressor stations, Recycling Plants, etc.





PORTABLE UNITS
for Cooling Engines in Oil Drilling and Temporary Pumping Service.

SPRAY TOWERS
For Pipe Line Pumping Stations and Similar Services.

SPRAY PONDS
for Refineries and Many Other Kinds of Heavy-Duty Service.

The MARLEY Company
Fairfax and Marley Roads, Kansas City, Kansas

Midway Refining Co., Coleman, Tex.

Ray McGlothlin and T. S. Jones, *Owners.* Refinery located at Goldsboro, Tex.

Midwest Refineries, Inc., Alma, Mich.

B. J. Skinner, *Pres.* and *Gen. Mgr.* J. E. McFall, V. M. Skinner, *V. P.s.* C. L. Fillmore, *Sec.* and *Treas.* J. G. Marshall, *Gen. Supt.* Refinery located at Alma, Mich.

Minerva Refining Co., Minerva, Tex.

E. L. Davis, S. F. Richardson, J. Smith, *Directors.* Refinery located at Minerva, Tex.

Mohawk Petroleum Corp., 405 Montgomery St., San Francisco, Calif.

A. L. Marsten, *Pres.* Frank R. Long, Lewis A. Marsten, C. B. Stevenson, *V. P.s.* V. Foster, *Asst. Sec.* E. L. Rogers, *Gen. Supt. Ref.* V. K. Douglas, *Pur. Agt.* Refinery located at Bakersfield, Calif.

Montgomery, H. A., Co., Inc., 17191 Swift Ave., Detroit, Mich.

H. A. Montgomery, *Pres.* and *Gen. Mgr.* W. Montgomery, Stanley Neal, L. A. Dall, James W. Laws, Jr., *V. P.s.* F. Alexander, *Sec.* and *Treas.* E. A. Nill, *Gen. Supt. Ref.* Robert Egbert, *Asst. Supt.* Refinery located at Findlay, Ohio.

Moorcroft Refining Co., Inc., Moorcroft, Wyo.

Earl M. Dorris, *Chm. Bd.* and *Pres.* J. M. Crayne, Kelso, Wash., *V. P.* L. G. Dorris, *Sec.* and *Treas.* Earl M. Dorris, *Gen. Mgr. Ref.* and *Pur. Agt.* Refinery located at Moorcroft, Wyo.

Morton Refinery, Oilmont, Mont.

Refinery located at Oilmont, Mont.

Moutray Oil Co., Abilene, Tex.

E. W. Moutray, *Pres.* and *Gen. Mgr.* L. Paul Kirk, *V. P.* M. P. Moutray, *Sec.* and *Treas.* O. L. Snyder, *Ref. Supt.* C. N. Cameron, *Ch. Chem.* E. C. Daniel, *Pur. Agt.* Refinery located at Hawley, Tex.

Muenster Refining Co., Drawer G, Muenster, Tex.

A. G. Hutton, *Owner.* Refinery located at Muenster, Tex.

N

Naph-Sol Refining Co., P. O. Box 207, Muskegon, Mich.

W. E. Anderson, *Pres.* S. A. Steffen, *V. P.* A. W. Penny, *Sec.* C. S. Walkowiak, *Treas.* W. H. Cannon, *Gen. Supt. Ref.* H. B. Burrell, *Asst. Supt.* H. R. Marquand, *Ch. Chem.* E. A. Clarke, *Ch. Engr.* and *Pur. Agt.* Refinery located at Muskegon, Mich.

National Refining Co., The, Hanna Bldg., Cleveland, Ohio

W. H. Lamprecht, II, *Chm. Bd.* Edgar G. Hill, *Pres.* H. F. Heil, *V. P.* and *Treas.* C. S. Smith, *V. P.* Theodore J. H. Wiegand, *Sec.* C. A. Peterson, *Ch. Chem. Engr.* H. B. Setzler, Coffeyville, Kans.; Fred Bergen, Marietta, Ohio; George F. Arnold, Findlay, Ohio, *Ref. Supts.* S. A. White, *Pur. Agt.* Refineries located at Coffeyville, Kans.; Marietta, Ohio, and Findlay, Ohio.

North American Refinery Co., Chinook, Mont.

Refinery located at Chinook, Mont.

North Texas Refining Co., Gainesville, Tex.

R. L. Knight and J. R. Sullivan, *Owners.* Refinery located at Gainesville, Tex.

Northern Refineries, Inc., 324 State St., Alma, Mich.

H. M. Marquardt, *Pres.* Harvey M. Taggart, *V. P.* and *Gen. Mgr.* Fred Thoms, *Sec.* William Knoor, *Treas.* W. K. Graham, *Sales Mgr.* S. Jacobsen, *Ch. Chem.* Charles E. Harris, *Pur. Agt.* Russell Potts, *Supt.* Refinery located at Alma, Mich.

Northwestern Petroleum, Box No. 467, Newcastle, Wyo.

Ivan T. Minter, Osage, Wyo., *Gen. Supt. Ref.* F. W. Palis, *Ch. Engr.* Refinery located at Osage, Wyo.

Northwest Refining Co., Cut Bank, Mont.

L. B. O'Neil, *Chm. Bd.* and *Pres.* T. J. Landry, G. M. McCabe, *V. Ps.* V. R. Nelles, *Sec.-Treas.* T. J. Landry, *Gen. Mgr. Ref.* R. W. Wood, *Asst. Supt.* and *Ch. Engr.* R. W. Burns, *Ch. Chem.* A. T. Bowen, *Pur. Agt.* Refinery located at Cut Bank, Mont.

Norwalk Co., The, 634 S. Spring St., Los Angeles, Calif.

Lionel T. Barneson, *Pres.* H. J. Barneson, J. L. Barneson, *V. P.s* W. E. Kropp, *Sec.* L. L. Aubert, *Gen. Mgr. Ref.* H. M. Paulsen, *Gen. Supt. Ref.* K. E. Grigsby, *Ref. Supt.* H. W. Ball, *Asst. Supt.* Robert Boroff, *Pur. Agt.* Refinery located at Maricopa, Calif.

O

Ohio Oil Co., The, 539 S. Main St., Findlay, Ohio

O. D. Donnell, *Pres.* John McFadyen, C. L. Fleming, W. W. Fleming, G. E. McCullough, F. R. Clark, J. C. Donnell II, R. C. Gwilliam, *V. P.s.* E. B. Redpath, *Sec.* F. A. Bilistone, *Treas.* C. L. Fleming, *Gen. Mgr. Ref.* R. E. Luton, *Gen. Supt.* D. L. Winsett, Bristow, Okla.; H. E. Handy, Robinson, Ill.; B. B. Miller, Lovell, Wyo.; J. R. Barrott, Fort Worth, Tex., *Ref. Supts.* J. Turvey, Bristow, Okla.; H. L. Megan, Fort Worth, Tex., *Asst. Supts.* C. S. Sherk, *Pur. Agt.* Refineries located at Robinson, Ill.; Lovell, Wyo.; Fort Worth, Tex.; Bristow, Okla.

Oil Creek Refining Co., Titusville, Pa.

Frank J. McGraw, *Pres.* and *Gen. Mgr.* Walter Whetstone, Jr., *V. P., Sec.* and *Treas.* Frank Buross, *Gen. Supt. Ref.* Daniel Beck, *Asst. Supt.* George P. McGraw, *Process Supt.* George Acton, *Ch. Chem.* George Shannon, *Ch. Engr.* George L. Ehrhart, *Pur. Agt.* Refinery located at Titusville, Pa.

Old Dutch Refining Co., Muskegon, Mich.

E. J. Bouwsma, *Pres.* Earl C. Roff, *V. P.* Doris Zuackenbush, *Sec.* J. H. Bender, *Treas.* Earl C. Roff, *Gen. Mgr.* and *Supt.* George M. Sharum, *Asst. Supt.* John Tyson, *Ch. Chem.* Lee Self, *Ch. Engr.* Refinery located at Muskegon, Mich.

Olney Oil & Refining Co., Wichita Falls, Tex.

Frank Kell, *Chm. Bd.* C. W. Cahoon, Jr., *Pres., Treas.,* and *Gen. Mgr.* C. M. Crowell, *Sec.* Joe A. Kell, *V. P.* J. P. Slater, *Gen. Supt. Ref.* and *Pur. Agt.* C. W. Cahoon, Jr., *Mgr. R. and D.* C. C. Ellis, *Ch. Chem.* W. F. Page, *Ch. Engr.* Refinery located at North Olney, Tex.

Olympic Refining Co., 2425 California Ave., Long Beach, Calif.

Refinery located at Long Beach, Calif.

Omar Refining Co., 505 Oklahoma Bldg., Tulsa, Okla.

F. S. Whitaker, *Chm. Bd.* and *Pres.* J. H. Whitaker, *V. P.* M. H. Collins, *Sec.* and *Treas.* H. L. Welton, *Gen. Supt. Ref.* and *Pur. Agt.* H. B. Myers and J. C. Helton, *Asst. Supts.* W. R. Lembcke, *Ch. Chem.* Refinery located at Garber, Okla.

Onyx Refining Corp., Box 330, Abilene, Tex.

O. B. Stephens, *Pres.* and *Gen. Mgr. Ref.* Ray McGlothlin, *V. P.* and *Gen. Supt. Ref.* J. B. Self, *Sec.* C. I. Powell, *Treas.* Refinery located at Abilene, Tex.

Operators Oil & Refining Co., 2208 E. South St., Long Beach, Calif.

Refinery located at Long Beach, Calif.

Oriental Refining Co., 908 Equitable Bldg., Denver, Colo.

S. M. Newton, *Pres.* Max P. Zall, *V. P.* K. B. Harton, *Auditor* and *Asst. Sec.* Neil Blaine, *Gen. Mgr. Ref.* Paul H. Fox, *Gen. Supt. Ref.* K. P. Wilson, *Ch. Chem.* Refinery located at Denver, Colo.

P

Pacific States Oil & Terminals Co., 1601 Wilmington, San Pedro Road, Wilmington, Calif.

J. J. Coney, *Pres.* Stanley V. W. Hiller, H. H. Whitesel, *V. Ps.* L. R. Kerdell, *Sec.* and *Treas.* J. A. Milliff, *Gen. Mgr. Ref.* E. Lynn Kay, *Ch. Chem.* Wheeler F. Newman, *Pur. Agt.* Refinery located at Wilmington, Calif.

Pan American Petroleum Corp., 122 E. Forty-second St., New York City

E. G. McKeever, *Pres.* J. A. Carroll, Jr., New York City; A. E. Ralston, New Orleans, La., *V. P.s.* D. H. Baker, *Sec.* J. A. Carroll, Jr., *Treas.* D. J. Smith, *Gen. Mgr. Ref.* F. W. Grey, *Ref. Supt.* L. L. Robein, *Ch. Chem.* J. D. Tufts, *Ch. Engr.* J. A. Whitely, *Pur. Agt.* Refinery located at Destrehan, La.

Pan American Refining Corp., 122 E. Forty-second St., New York City

E. G. Seubert, *Chm. Bd.* Robert E. Wilson, *Pres.* E. G. McKeever, D. J. Smith, J. A. Carroll, Jr., *V. P.s.* D. H. Baker, *Sec.* J. A. Carroll, Jr., *Treas.* D. J. Smith, *Gen. Mgr. Ref.* P. J. Sweeny, Texas City, Tex., W. W. Hulin, Baltimore, Md. *Ref. Supts.* R. H. Price, Texas City, Tex., *Mgr. R. and D.* R. H. Price, *Ch. Chem.* S. B. Schapiro, Texas City, Tex., *Ch. Engr.* J. A. Whitely, *Pur. Agt.* Refineries located at Texas City, Tex.; Baltimore, Md.

Pan Pacific Oil Co., Wilmington, Calif.

Refinery located at Wilmington, Calif.

Palomar Refining Co., P. O. Box 1648, Bakersfield, Calif.

Refinery located at Mountain View, Calif.

Paluxy Asphalt Co., Talco, Tex.

Eugene Constantin, *Pres.* H. J. Toups, *Supt.* Refinery located at Talco, Tex.

Panhandle Refining Co., P. O. Box 1191, Wichita Falls, Tex.

Roy B. Jones, *Pres.* M. A. Chambers, R. C. Stanford, G. W. Reed, *V. P.s.* H. F. Bennett, *Sec.* M. A. Chambers, *Treas.* W. F. Sims, *Gen. Mgr.* G. D. Kinard, Wichita Falls, Tex.; R. W. Jacobs, Kings Mill, Tex.; J. C. Hester, Lueders, Tex., *Ref. Supts.* E. W. Ellis, *Ch. Chem.* Roy J. Mann, *Pur. Agt.* Refineries located at Kings Mill, Tex.; Wichita Falls, Tex.; Lueders, Tex.

Payward Refining Co., P. O. Box 87, Shamrock, Tex.

H. C. Pace and John Ward, *Co-Partnership.* A. T. Gregg, *Ch. Engr.* Refinery located at Shamrock, Tex.

Pecos Diamond Refining Co., Inc., Artesia, N. M.

G. A. Grober, *Chm. Bd.* and *Pres.* I. M. Grober, *V. P.* Henry Herriman, *Sec.* and *Treas.* G. A. Grober, *Gen. Mgr. Ref.* and *Pur. Agt.* Earl Ployhar, *Ref. Supt.* Joe Blair, *Asst. Supt.* and *Ch. Chem.* Refinery located at Artesia, N. M.

Peerless Oil Co., Saginaw, Mich.

Refinery located at Saginaw, Mich.

Pennsylvania Oil Products Refining Co., Warren, Pa.

M. F. Cowden, *Pres.* G. E. Cowden, *V. P.* H. E. Lawrence, *Sec.* W. H. Cowden, *Treas.* S. P. Stannard, Eldred, Pa., *Supt.* Refinery located at Eldred, Pa.

Pennsylvania Refining Co., Butler, Pa.

John A. Beck, *Pres.* A. B. Weingard, *V. P.* Paul R. Beck, *Sec.* and *Treas.* W. W. Beck, *Gen. Mgr. Ref.* A. C. Mosher, Titusville, Pa.; G. M. Kirkwood, Karns City, Pa., *Ref. Supts.* James L. Eisler, *Ch. Chem.* Refineries located at Titusville, Pa. and Karns City, Pa.

Pennzoil Co., The, Drake Theater Bldg., Oil City, Pa.

C. L. Suhr, *Chm. Bd.* W. S. Zehrung, *Pres.* M. A. Brewster, D. W. Grant, *V. P.s.* R. A. Browne, *Sec.* M. A. Brewster, *Treas.* L. D. Fulton, *Gen. Supt. Ref.* J. M. Hinman, Rouseville, Pa.; D. J. Harvey, Oil City, Pa., *Asst. Supts.* G. O. Ebrey, *Ch. Chem.* P. M. Robinson, *Ch. Engr.* A. W. Clinger, *Pur. Agt.* Refineries located at Rouseville, Pa., and Oil City, Pa.

Peppers Gasoline Co., Box 88, Oklahoma City, Okla.

Charles C. Peppers, *Pres.* H. H. Champlin, *Sec.* and *Treas.* Charles C. Peppers, *Gen. Mgr.* J. C. McConnico, *Gen. Supt. Ref.* Refinery located at Oklahoma City, Okla.

Perry Petroleum Co., P. O. 147-1, Denver, Colo.

F. L. Perry, *Pres.* and *Treas.* L. H. Perry, *V. P.* C. F. Russel, *Sec.* H. B. Masters, *Ref. Supt.* F. L. Perry, *Pur. Agt.* Refinery located at Adams City, Colo.

Petrol Corp., The, 950 S. Broadway, Los Angeles, Calif.

Edwin W. Pauley, *Pres.* Harold R. Pauley, *V. P.* James P. Fitzpatrick, *Sec.* Claude L. Cameron, *Treas.* W. T. Christman, *Gen. Mgr. Ref.* George Miller, *Gen. Supt. Ref.* Fred Griffith, Ray Kerr, *Asst. Supts.* Lyle Caldwell, *Mgr. R. and D.* G. B. Taylor, *Pur. Agt.* Refinery located at Los Angeles, Calif.

Petrolane, Ltd., Long Beach, Calif.

Refinery located at Long Beach, Calif.

Pettus Oil & Refining Co., Pettus, Tex.

Morris Roberts, *Pres.* W. D. Walton, *V. P.* George Ray, Jr., *Sec.* and *Treas.* S. R. Hunt, *Gen. Mgr. Ref.* and *Pur. Agt.* John Pollard, *Gen. Supt. Ref.* Refinery located at Pettus, Tex.

Phillips Petroleum Co., Bartlesville, Okla.

Frank Phillips, *Chm. Bd.* K. S. Adams, *Pres.* Don Emery, G. G. Oberfell, H. E. Koopman, C. P. Dimit, M. P. Youker, F. E. Rice, J. M. Sands, C. R. Musgrave, A. M. Hughes, C. O. Stark, A. H. Riney, R. C. Jopling, H. A. Trower, George R. Baker, *V. Ps.* B. F. Stradley, *Sec.* R. M. Riggins, *Treas.* M. P. Youker, *V. P. in Chg. Ref.* W. G. Hiatt, *Chm. Ref. Comm.* Hugh Miller, Borger, Tex.; J. W. Mitchell, Kansas City, Kans.; R. D. Evans, Okmulgee, Okla., *Mgrs. Ref.* W. H. Creel, *Ch. Engr.* E. H. Bender, *Mgr. Bartlesville Office.* M. B. Heine, *Pur. Agt* Refineries located at Borger, Tex.; Kansas City, Kans.; Okmulgee, Okla.

Phoenix Refining Co., P. O. Box 248, Station A, San Antonio, Tex.

Raymond R Russell, *Owner* and *Mgr.* Cecil Mullenix, *Ref. Supt.* at Houston. Refineries located at Houston, Tex.; San Antonio, Tex.; Pettus, Tex.; Bruni, Tex.

Pilgrim, Inc., Kingston, Okla.

Montie Blakely, *Pres.* Vera Blakely, *V. P.* R. M. Massey, *Sec.* and *Treas.* Montie Blakely, *Gen. Mgr. Ref.* and *Pur. Agt.* Refinery located at Kingston, Okla.

Pilot Butte Oil Co., Morton, Wyo.

H. Kenyon Burch, *Chm. Bd.* Alfred Ellerby, *Sec.* and *Treas.* James T. Majors, *Gen. Mgr. Ref.* Alfred Ellerby, *Pur. Agt.* Refinery located at Morton, Wyo.

Pioneer Oil & Refining Co., 604 Carolina St., San Antonio, Tex.

A. B. Slimp, *Chm. Bd.* and *Pres.* C. A. Slimp, *V. P.* M. L. Roark, *Sec.* F. A. Slimp, *Sales Mgr.* C. A. Slimp, *Pur. Agt.* Refinery located at Somerset, Tex.

Plainview Refining Co., Plainview, Tex.

J. C. Hooper, *Pres.* O. D. Byrd, *Sec.* and *Treas.* E. M. Corah, *Gen. Mgr.* L. A. Martin, *Supt.* Refinery located at Plainview, Tex.

Pontiac Refining Co., 3400 Lawrence St., Corpus Christi, Tex.

Saul Singer, *Pres.* and *Treas.* Edwin Singer, *Sec.* and *Pur. Agt.* Otto Geppelt, *Ref. Supt.* Refinery located at Corpus Christi, Tex.

Porter Oil Co., Sidney, Neb.

R. J. Porter, *Gen. Mgr. Ref.* George Porter, *Gen. Supt.* M. P. Kermickle, *Ref. Supt.* George Porter, *Ch. Chem.* M. P. Kermickle, *Ch. Engr.* R. J. Porter, *Pur. Agt.* Refinery located at Sidney, Neb.

Post Refining Co., P. O. Box 447, Rotan, Tex.

T. E. Patton, *Pres.* and *Gen. Mgr. Ref.* Jack Patton, *V. P.* and *Ch. Chem.* T. E. Patton, *Pur. Agt.* Refinery located at Rotan, Tex.

Premier Oil Refining Co. of Texas, Longview, Tex.

J. R. Parten, *Chm. Bd.* Sylvester Dayson, *Pres.* and *Gen. Mgr. Ref.* S. W. Ross, *V. P.* R. P. Hargis, *Sec.* and *Treas.* Elmer Smith, Willow Springs, Tex.; W. S. Cazort, Jr., Cotton Valley, La., *Ref. Supts.* P. W. Morgan, *Ch. Chem.* L. G. Dufilho, *Ch. Engr.* R. P. Hargis, *Pur. Agt.* Refineries located at Willow Springs, Tex.; Cotton Valley, La.

Producers Refining, Inc., West Branch, Mich.

Philip D. Dexter, *Chm. Bd.* James P. Dunnigan, *Pres., Treas.,* and *Gen. Mgr. Ref.* Philip D. Dexter, *Sec.* Charles VanWald, *V. P.* H. B. Martin, *Gen. Supt. Ref.* L. Edsall, *Ch. Chem.* Jim Christopherson, *Ch. Engr.* A. E. Crawford, *Pur. Agt.* Refinery located at Wesh Branch, Mich.

Pure Oil Co., The, 35 East Wacker Drive, Chicago, Ill.

B. G. Dawes, *Chm. Bd.* H. M. Dawes, *Pres.* C. B. Watson, R. W. McIlvain, L. S. Wescoat, Rawleigh Warner, N. H. Weber, *V. P.s.* L. S. Wescoat, *Sec.* Rawleigh Warner, *Treas.* J. P. Langfitt, *Asst. to V. P. in Chg. Ref.* R. C. Osterstrom, *Gen. Mgr.;* O. B. Wendeln, *Supt.,* Toledo, Ohio. J. C. Megraw, Cabin Creek, W. Va.; E. E. McPherson, Newark, Ohio; E. A. McCadden, Marcus Hook, Pa.; K. B. May, Midland, Mich.; R. L. Vernor, Nederland, Tex., *Ref. Supts.* W. L. Dulaney, Cabin Creek; D. C. Doramus, Midland; Harry Hook, Heath Refinery at Newark; H. H. Drongerger, Smiths Bluff Refinery at Nederland; C. D. Freshour, Toledo, *Gen. Oper. Foremen.* C. R. Wagner, *Mgr. R. and D.* C. R. Wagner, *Ch. Chem.* D. E. Sullivan, *Ch. Engr.* G. L. Parsons, *Pur. Agt.* Refineries located at Cabin Creek, W. Va.; Newark, Ohio; Muskogee, Okla.; Midland, Mich.; Nederland, Tex.; Toledo, Ohio.

Q

Quaker State Oil Refining Corp., Oil City, Pa.

H. J. Crawford, *Pres.* S. Messer and James D. Berry, *V. P.s.* W. R. Reitz, *Sec.* Charles D. Berry, *Treas.* G. B. Hunter, *Gen. Mgr. Ref.* E. E. Ebner, *Gen. Supt. Ref.* J. B. Northrop, St. Marys, W. Va.; E. E. Ebner, Emlenton, Pa.; W. H. Rockman, Bradford, Pa., *Ref. Supts.* L. R. Forker, *Pur. Agt.* Refineries located at Emlenton, Pa.; St. Marys, W. Va.; Farmers Valley, Pa.

R

Rado Refining Co., McAllen, Tex.

Charles J. Holland, *Pres., Gen. Mgr.* and *Pur. Agt.* Ralph E. Fair, *V. P.* J. L. Lobdell, *Sec.* and *Treas.* Jack D. Harding, *Gen. Supt. Ref.* Refinery located at McAllen, Tex.

Raven Oil & Refining Co., Rangely, Colo.

John J. Sloan, *Pres.* George D. Merkley, *V. P.* R. A. Bryson, *Sec., Treas.* and *Gen. Mgr. Ref.* M. M. Cook, *Gen. Supt. Ref.* Refinery located at Rangely, Colo.

Red River Refining Co., 4323 S. Western Blvd., Chicago, Ill.

V. S. Welch, *Pres.* P. F. Goodrich, *V. P.* R. S. Watt, *Sec.* and *Treas.* C. A. Harris, *Gen. Supt. Ref.* and *Pur. Agt.* J. E. Schulze, *Mgr. R. and D.* E. Lamosney, *Ch. Chem.* Refinery located at Burnham, Ill.

Refugio Refinery, The, 1204 Alamo National Bldg., San Antonio, Tex.

Garland Clymore, *Chm. Bd.* and *Pres.* R. S. Wyrick, Refugio, Tex., *V. P.* and *Gen. Mgr. Ref.* B. S. Fenlaw, *Sec.* R. C. Willett, *Treas.* J. J. Howell, Edinburg, Tex., *Asst. Supt.* V. A. Goss, Refugio, Tex., *Ch. Chem.* W. H. Hughes, Refugio, Tex., *Ch. Engr* Refineries located at Refugio, Tex.; Edinburg, Tex.

Regal Products Co., Soap Creek, Mont.

Refinery located at Soap Creek, Mont.

Republic Oil Refining Co., Benedum-Trees Bldg., Pittsburgh, Pa.

O. D. Robinson, *Pres.* D. W. Hovey, J. M. Gardiner, W. E. Huston, *V. P.s.* W. H. Moreland, *Sec.* and *Treas.* D. W. Hovey, *Gen. Mgr.* C. E. Robertson, *Supt. Ref.* C. C. Evans, *Asst. Supt.* D. M. Veale, *Ch. Chem.* L. Keller, *Ch. Engr.* D. W. Hovey, *Pur. Agt.* Refinery located at Texas City, Tex.

Resolute Oil Corp., Box 1927, Great Falls, Mont.

Julius C. Peters, *Pres.* W. R. Strain, *V. P.* Charles A. Harper, *Sec.* A. W. Strain, *Treas.* B. J. Manley, *Gen. Mgr. Ref.* Refinery located at the Badger Basin field, Park County, Wyo. (P. O. Powell, Wyo.).

Resolute Oil Corp., Strain Bldg., Great Falls, Mont.

Julius C. Peters, *Pres.* W. R. Strain, *V. P.* Charles A. Harper, *Sec.* A. W. Strain, *Treas.* B. J. Manley, *Gen. Mgr. Ref.* Refinery located in Badger Basin, Park County, Wyoming.

Rex Oil Refinery, Rapid City, S. D.

Elmer E. Ratliff, *Pres.* and *Ch. Engr.* G. M. Lewis, *Sec., Treas.* and *Gen. Supt.* Charles F. Clark, *Mgr. R. and D.* and *Ch. Chem.* Refinery located at Rapid City, S. D.

Rice Ranch Oil Co., P. O. Box 31, Santa Maria, Calif.

J. C. Netz, *Pres.* Emil Kirchner, *V. P.* F. H. Powell, *V. P.* I. M. Hine, *Sec.* George Holmes, *Plant Supt.* B. Billington, *Asst. Supt.* Refinery located at Orcutt, Calif.

Richfield Oil Corp., 555 S. Flower St., Los Angeles, Calif.

H. F. Sinclair, *Chm. Bd.* W. Alton Jones, *Chm. Finance Comm.* Charles S. Jones, *Pres.* W. T. Dinkins, A. M. Kelley, F. A. Morgan, *V. Ps.* M. Richard Gross, *Treas.* W. T. Autrey, *Comptroller.* Cleve B. Bonner, *Sec.* E. B. Downey, *Asst. Treas.* and *Asst. Sec.* Leonard Switzer, *Asst. Sec.* C. R. McKay, *Gen. Mgr. Ref.* R. A. Panero, Watson, Calif., and Rioco, Calif.; William Murray, Vinvale Calif., *Ref. Supts.* W. R. Davis, Watson, Calif., *Asst. Supt.* C. K. Hewes, *Ch. Chem.* Frank J. Fontana, *Ch. Engr.* H. H. Kelly, *Pur. Agt.* Refineries located at Watson, Calif.; Hynes (Rioco), Calif.; Vinvale, Calif.

Roath Refining Co., 5776 Cherry Ave., Long Beach, Calif.

Refinery located at Long Beach, Calif.

Rock Island Refining Co., Duncan, Okla.

L. B. Simmons, *Pres.* L. E. Kincannon, H. B. Alspaugh, O. W. Simmons, H. C. Allen, *V. P.s.* W. Witt, *Sec.* and *Treas.* L. B. Simmons, *Gen. Mgr. Ref.* A. L. Rayburn, *Ref. Supt.* A. R. Love, R. C. Underwood, *Asst. Supts.* D. A. Fischbeck, *Ch. Chem.* R. H. Roper, *Pur. Agt.* Refinery located at Beckett, Okla.

Rodessa Oil & Refining Corp., First National Bank Bldg., Shreveport, La.

M. J. Grogan, *Pres.* B. P. Crittenden, *V. P.* and *Gen. Mgr. Ref.* T. H. Grobe, *Sec.* and *Treas.* H. D. McLean, *Gen. Supt. Ref.* J. R. Cox, *Asst. Supt.* and *Ch. Chem.* G. W. Heinecke, *Ch. Engr.* O. F. Shaver, *Pur. Agt.* Refinery located at Cedar Grove, La.

Roosevelt Oil Co., Junction Pickard St. and Ann Arbor R.R. Tracks, Mount Pleasant, Mich.

C. L. Maguire, *Pres.* T. F. Caldwell, William L. Davis, *V. P.s.* S. M. Fasquelle, *Sec.* and *Treas.* E. Allan Morrow, *Asst. Sec.* and *Treas.* D. Y. Hewitt, Don J. Baize, *Gen. Mgrs. Ref.* J. J. Kerrins, *Process Supt.* Earl Martin, *Ch. Chem.* H. L. Peacock, *Ch. Engr.* L. J. Thompson, *Pur. Agt.* Refinery located at Mount Pleasant, Mich.

Root Petroleum Co., Box 1123, Shreveport, La.

D. P. Hamilton, *Pres.* H. Canon, D. A. Brown, *V. P.s.* T. E. Beaird, *Sec.* and *Pur. Agt.* L. C. Hallonquist, *Treas.* E. Kimes, *Gen. Supt.* John Brown, *Asst. Supt.* R. T. Colquette, *Mgr. R. and D.* Lincoln White, *Ch. Chem.* Refinery located at El Dorado, Ark.

Roper Petroleum Co., Parsons, Kans.

E. E. Roper, *Mgr. Ref.* and *Pur. Agt.* H. E. Roper, *Asst. Mgr.* and *Pur. Agt.* R. H. Hall, *Gen. Supt.* Refinery located at Parsons, Kans.

Rothschild Oil Co., Santa Fe Springs, Calif.

Harry S. Rothschild, *Pres.* Oscar Samuelson, *V. P.* Josephine E. Rothschild, *Sec.* and *Treas.* L. A. Whitlock, *Supt.* Refinery located at Santa Fe Springs, Calif.

Rusk Oil & Refining Co., Box 270, Tyler, Tex.

H. H. Coffield, *Pres.* George P. Mann, *V. P.* and *Gen. Supt. Ref.* J. H. Edwards, *Sec.* and *Treas.* J. H. Edwards, *Gen. Mgr. Ref.* Refinery located at Overton, Tex.

Russell Producing Co., The, 924 Union Trust Bldg., Cincinnati, Ohio

John J. Rowe, *Pres.* William R. Foulkes, Charles W. Finch, E. W. Harrison, *V. P.s.* Frank H. Blum, *Sec.* and *Treas.* R. L. Mong, Sunbright, Tenn., *Gen. Mgr. Ref.* and *Pur. Agt.* Refinery located at Sunbright, Morgan County, Tenn.

S

St. Helens Petroleum Co., Ltd., The, Los Angeles, Calif.

G. W. Ivey, *Chm. Bd.* H. Towers, *Sec.* A. P. McEachern, Los Angeles, *Sec.* Chas. Drader, *Gen. Mgr. Ref.* C. Z. Webb, *Gen. Supt. Ref.* C. W. Spark, *Asst. Supt.* and *Ch. Chem.* C. Z. Webb, *Mgr. R.* and *D.* and *Ch. Engr.* H. C. Drader, *Pur. Agt.* Refinery located at Pico, Calif.

San Antonio Refining Co., Southton, Tex.

Otto Gerbes, *Owner.* Refinery located at Southton, Tex.

San Fernando Refining Co., Box 310, San Fernando, Calif.

William D. Park, *Gen. Mgr. Ref.* I. D. Parton, *Asst. Supt.* Don Conklin, *Ch. Chem.* E. Ericson, *Pur Agt.* Refinery located at Newhall, Calif.

Seaboard Refining Co., Pescataway, N. J.

Allen H. Clarke, 80 Board St., New York, N. Y., *Treas.* George Benhoff, *Gen. Supt.* Refinery located at Ventura, Calif.

Seaside Oil Co., 330 State St., Santa Barbara, Calif.

M. W. O'Brien, *Chm. Bd.* and *Pres.* H. B. Kellogg, *V. P.* G. C. Howell, *Sec.* H. L. Harms, *Treas.* M. W. O'Brien, *Gen. Mgr. Ref.* D. C. Peet, *Gen. Supt. Ref.* L. C. McCampbell, Ventura, Calif.; D. E. Searles, Summerland, Calif., *Asst. Supts.* C. W. Chamberlain, *Pur. Agt.* Refineries located at Ventura, Calif. and Summerland, Calif.

Shallow Water Refining Co., The, P. O. Box 399, Scott City, Kans.

Morten Brown, *Pres.* J. B. Allison, *V. P.* D. M. Dryden, *Sec.* C. L. Crenshaw, *Treas.* and *Gen. Mgr. Ref.* V. F. Benest, *Gen. Supt. Ref.* and *Ch. Engr.* W. J. Dorner, *Asst. Supt.* L. P. Aeschliman, *Mgr. R. and D.* V. F. Benest, *Pur. Agt.* Refinery located at Shallow Water, Kans.

Shamrock Oil & Gas Corp., The, Amarillo Bldg., Amarillo, Tex.

John J. Sheerin, *Pres.* Robert T. Wilson, H. C. Fownes, II, *V. P.s.* Robert T. Wilson, *Gen. Mgr.* E. C. Will, *Gen. Supt. Ref.* F. B. Mack, *Ch. Engr.* Carroll E. Gregg, *Ch. Chem.* H. B. Wade, *Supt. Meldavis Refinery,* Lefors, Tex. Refineries located at Sunray, Tex.; Lefors, Tex.

Shell Oil Co., Shell Bldg., 100 Bush St., San Francisco, Calif.

R. G. A. Van Der Woude, *Chm. Bd.* S. Belither, *Pres.* R. A. C. Guepin, H. Bloemgarten, F. S. Clulow, E. F. Davis, D. Heggie, L. G. McLaren, J. U. Stair, *V. P.s.* A. R. Bradley, *Sec.* D. Heggie, *Treas.* F. S. Clulow, *Gen. Mgr. Ref.* A. Myers, Coalinga, Calif.; I. M. Hemphill, Dominguez, Calif.; I. M. Hemphill, Wilmington, Calif.; A. H. Calderwood, Martinez, Calif., *Ref. Supts.* D. M. Morrison, Martinez; W. S. Nix, Martinez; E. A. Romer, Wilmington; D. M. Sheldon, Dominguez, *Asst.* Supts. N. W. Thompson, *Ch. Engr.* J. C. Storey, *Pur. Agt.* Refineries located at Coalinga-Oilfields, Calif.; Dominguez-Wilmington, Calif.; Wilmington-Wilmington, Calif.; Martinez-Martinez, Calif.

Shell Petroleum Corp., Shell Bldg., St. Louis, Mo.

A. Fraser, *Pres.* H. H. Anderson, R. P. Bascom, A. J. Galloway, T. E. Swigart, R. B. Roark, J. W. Watson, *V. P.s* J. W. Watson, *Treas.* P. E. Lakin *V. P. Mktg.* A. E. Lacomble, *V. P. Mfg.* Joe T. Dickerson, *Sec.* E. D. Cumming, Wood River, Ill.; R. C. Roberts, East Chicago, Ind.; P. E. Foster, Norco, La.; R. H. Waser, Houston, Tex. *Ref. Mgrs.* T. G. Elder, Wood River, Ill.; F. C. Cutting, East Chicago, Ind.; P. E. Hurley, Norco, La.; J. L. Miller, Houston, Tex., *Supts.* C. B. Singleton, *Pur. Agt.* Refineries located at Wood River, Ill.; East Chicago, Ind.; Norco, La.; Houston, Tex.

Shelly Refining Co., Box 1191, Bay City, Tex.

F. E. Shelly, *Pres.* and *Treas.* R. D. Williams, *V. P.* and *Gen. Mgr. Ref.* K. I. Carter, *Sec.* Alford Smith, *Gen. Supt. Ref.* John Smith, *Ch. Chem.* F. E. Shelly, *Ch. Engr.* R. D. Williams, *Pur. Agt.* Refinery located at Bay City, Tex.

Sheridan Refining Co., Sheridan, Wyo.

Refinery located at Sheridan, Wyo.

Sherwood Refining Co., Englewood, N. J.

H. H. Sherwood, *Pres.* Harry H. Watkins, New York City, *V. P.* James W. Jackson, *Sec.* Grace D'Amore, *Treas.* Arthur J. Franks, *Gen. Mgr. Ref.* and *Pur. Agt.* George F. Henry, *Gen. Supt. Ref.* Robert E. Parker, *Ch. Chem.* C. J. McManus, *Mech. Supt.* Refinery located at Warren, Pa.

Shoreline Oil Co., P. O. Box 103, Shreveport, La.

C. M. Leonard, *Pres.* R. C. Burdick, *V. P.* R. R. Bickel, *Pur. Agt.* Refinery located at Shoreline, La.

Sinclair Refining Co., Inc., 630 Fifth Ave., New York, N. Y.

H. R. Gallagher, *Chm. Bd.* E. W. Sinclair, *Pres.* J. W. Carnes, Edward H. Chandler, Sheldon Clark, M. L. Gosney, E. W. Isom, C. H. Kountz, J. R. Manion, J. M. O'Day, L. V. Stanford, George H. Taber, Jr., *V. P.s.* O. M. Gerstung, *Sec.* M. L. Gosney, *Treas.* George H. Taber, Jr., *V. P. Ch. Ref.* George R. Lord, *Gen. Mgr. Ref.* E. B. Phillips, *Ch. Chem.* J. S. Hess, *Ch. Engr.* H. B. Malone, *Pur. Agt.* Refineries located at East Chicago, Ind.; Kansas City, Kans.; Coffeyville, Kans.; Wellsville, N. Y.; Sand Springs, Okla.; Marcus Hook, Pa.; Fort Worth, Tex.; Gladewater, Tex.; Houston, Tex.; Parco, Wyo.

Skelly Oil Co., Skelly Bldg., Tulsa, Okla.

W. G. Skelly, *Pres.* C. C. Herndon, *Ex. V. P.* and *Counsel;* H. M. Stalcup, W. T. Atkins, A. H. Hyden, *V. P.s.* F. T. Hopp, *Sec.* and *Treas.* K. J. Smith, *Gen. Mgr.* and *Supt. Ref.* A. G. Schuessler, C. E. Gore, *Asst. Supts.* R. W. Leslie, *Mgr. R. and D.* E. A. Todd, *Ch. Chem.* R. E. Dace, *Res. Engr.* F. W. Robertson, *Pur. Agt.* Refinery located at Eldorado, Kans.

Sloan & Zook Co., The, Carver St. Extension, Warren, Pa.

R. T. Zook, *Pres.* William J. Sloan, *V. P.* and *Treas.* H. A. Rich, *Asst. Treas.* P. H. Zook, *Gen. Mgr. Ref.* J. M. Moore, *Pur. Agt.* Refinery located at Warren, Pa.

PERFORMANCE *PLUS*

• *that's* •

Lonergan

The LONERGAN Whip Test has been conducted on the same Lonergan Gauge, 82 pulsations a minute, 8 hours a day, since July 22, 1936. This gauge is still in perfect condition—undeniable proof of the stamina and inbuilt supremacy of LONERGAN Gauges.

Solid tool steel is accurately drilled and tooled to within 2/1000 of an inch of the specified standard in making tubing for models "HRG," "LRG" and "GH" LONERGAN Gauges. Bourdon Stainless Steel tubes can also be furnished when specified. All gauges are triple shop-tested to within 1% of absolute accuracy. This precision in manufacture with only the highest grade materials has made LONERGAN Gauges standard equipment wherever the best gauges are required.

MODEL "HRG"
High Pressure Gauges

Designed with practically test gauge accuracy in commercial installations and especially adapted to refinery service and all high pressures, where accuracy and life of the gauge are paramount.

MODEL "WTN"

Model "WTN" Safety Valve has a full throat tube seat area which results in large capacity without restriction of the flow. The disc is top-guided and the spring encased to separate it from the flow of steam or hot liquids. The symmetrical design of the working parts means uniform contraction and expansion and, therefore, long life.

For prompt service in gauges, relief valves, and other power plant specialties, order from your local Lonergan distributor or write direct.

J. E. LONERGAN CO.
SECOND & RACE STS., PHILADELPHIA, PA.
300 Specialties for Power Plants
Standard Since 1872

Lonergan
GAUGES · VALVES · SPECIALTIES

Snow Cap Oil Co., Sunburst, Mont.

Adam J. Eulberg, *Owner.* Refinery located at Sunburst, Mont.

Socal Oil & Refining Co., 1004 Rowan Bldg., Los Angeles, Calif.

C. A. Johnson, *Pres.* and *Gen. Mgr.* J. H. Grimes, *V. P.* and *Ref. Supt.* Paul Fussell, *Sec.* P. J. Hallicy, *Treas.* E. T. Carlton, *Asst. Supt.* R. B. Whittington, *Ch. Chem.* Refinery located at Huntington Beach, Calif.

Socony-Vacuum Oil Co., Inc., Lubrite Division, 4140 Lindell Blvd., St. Louis, Mo.

H. T. Ashton, *Gen. Mgr.* D. A. Windsor, *Mgr. Ref.* J. B. Hickey (East St. Louis Plant), *Ref. Supt.* A. J. Kirwin, *Asst. Supt.* L. T. Doiron, *Ch. Chem.* R. A. Frevert, *Ch. Engr.* J. H. MacCrea, *Pur. Agt.* Refinery located at East St. Louis, Ill.

Socony-Vacuum Oil Co., Inc., White Eagle Division, Kansas City, Mo.

R. R. Irwin, *Gen. Mgr. Ref.* E. C. Marshall, *Gen. Supt. Ref.* C. C. Durkee, Augusta, Kans.; J. W. Glass, Casper, Wyo., *Ref. Supts.* Emory M. Skinner, *Ch. Engr.* Refineries located at Augusta, Kans.; Casper, Wyo.

Socony-Vacuum Oil Co., Inc., 26 Broadway, New York, N. Y.

J. A. Brown, *Pres.* C. E. Arnott, E. R. Brown, A. F. Corwin, F. S. Fales, G. V. Holton, H. F. Sheets, *V. P.s.* W. D. Bickham, *Sec.* A. T. Roberts, *Treas.* W. F. Burt, *Chm. Mfg. Comm.* Dr. W. L. Linton, Brooklyn, N. Y.; R. B. Malone, Long Island City, N. Y.; R. T. Lockwood, Buffalo, N. Y.; C. W. Schaffer, Providence, R. I.; J. F. Turner, Olean, N. Y.; D. L. Hooker, Paulsboro, N. J.; C. C. Durkee, Augusta, Kans.; J. W. Class, Casper, Wyo.; J. B. Edwards, Trenton, Mich.; D. A. Windsor, E. St. Louis, Ill.; William Hildebrandt, E. Chicago, Ind., *Ref. Supts.* Dr. J. B. Rather, *Ch. Chem.* A. E. Esser, *Ch. Engr.* J. R. Taylor, *Pur. Agt.* Refineries located at Brooklyn, N. Y.; Long Island City, N. Y.; Buffalo, N. Y.; Providence, R. I.; Olean, N. Y.; Paulsboro, N. J.; Augusta, Kans.; Casper, Wyo.; Trenton, Mich.; E. St. Louis, Ill.; E. Chicago, Ind.

South Kentucky Pipe Line Co., Somerset, Ky.

R. C. Snyder, *Pres.* and *Gen. Mgr. Ref.* H. B. Wood, *V. P.* Earl R. Tate, *Sec., Treas.* and *Pur. Agt.* Dexter Parmley, *Gen. Supt. Ref.* Refinery located at Somerset, Ky.

Southland Refining Co., Olney, Tex.

Refinery located near Bryson, Tex.

Southport Petroleum Co., 305 Sterling Bldg., Houston, Tex.

Cornelius Kroll, *Pres.* and *Treas.* G. A. Kroll, *V. P.* Marion Travis, *Sec.* and *Gen. Mgr.* Lee LeFerney, *Plant Mgr.* J. C. Hinds, Texas City; H. A. Matthew, Kilgore, *Ref. Supts.* Refineries located at Texas City and Kilgore, Tex.

Southwestern Oil & Refining Co., Port & Summers Sts., Corpus Christi, Tex.

S. S. Seltzer, Sr., *Pres.* F. R. Sylvestre, *V. P.* S. S. Seltzer, Jr., *Sec., Treas.* and *Gen. Mgr. Ref.* W. B. Pickerell, *Vice Sec.* and *Treas.* G. W. Stephenson, *Gen. Supt. Ref.* and *Pur. Agt.* W. N. Hicks, *Ch. Chem.* Refinery located at Corpus Christi, Tex.

Southwestern Oil & Refining Co., Inc., 204 Noble Bldg., Lake Charles, La.

Harry E. Clark, *Pres.* and *Gen. Mgr.* S. W. Sweeney, *V. P.* George Howell, *Sec.* and *Treas.* I. B. Chittenden, *Gen. Supt. Ref.* Refinery located at Lake Charles, La.

Sovereign Refining Co., 777 N. Washington Ave., Saginaw, Mich.

Will J. Sovereign, *Pres.* Will F. Sovereign, *V. P.* John S. Clark, *Sec.* Florence L. Sovereign, *Treas.* Charles A. Jouett, *Gen. Supt. Ref.* J. Lempke, *Pur. Agt.* Refinery located at Saginaw, Mich.

Stamford Refining Co., Stamford, Tex.

F. W. Peckham, *Owner.* Refinery located at Stamford, Tex.

Standard Oil Co. of Louisiana, 2134 St. Charles Ave., New Orleans, La.

M. J. Rathbone, *Pres.* M. W. Boyer, J. A. Bechtold, J. R. McWilliams, S. W. Day, J. E. Skehan, *V. P.s.* S. E. Kidd, *Sec.* J. A. Bechtold, *Treas.* M. W. Boyer, *Gen. Mgr. Ref.* R. J. Stone, *Gen. Supt. Ref.* L. V. Robbins, *process;* A. F. Fritchie, *mechanical, Asst. Supts.* Dr. C. L. Brown, *Mgr. R. and D.* M. B. Amis, *Ch. Chem.* A. F. Fritchie, *Ch. Engr.* W. N. Cottrell, *Pur. Agt.* Refinery located at Baton Rouge, La.

Standard Oil Co. of California, 225 Bush St., San Francisco, Calif.

W. H. Berg, H. D. Collier, R. W. Hanna, R. K. Davies, M. E. Lombardi, *V. Ps.* J. H. Tuttle, *Sec.* V. F. Palmer, *Treas.* Refineries located at Richmond, Calif.; El Segundo, Calif.; Seguro, Calif.

Especially Recommended for use in the

COPPER SWEETENING PROCESS

•

NICHOLS

TRIANGLE BRAND

COPPER SULPHATE

is preferred by leading refineries because of its high copper content, dependable uniformity and exceptional purity and freedom from foreign and inert matter.

99% Pure

Quotation on request, on any quantity required. Prompt shipments can be made from our nearest plant.

PHELPS DODGE
REFINING CORPORATION

40 Wall Street, New York—230 No. Michigan Ave., Chicago

Standard Oil Co. (Indiana), 910 S. Michigan Ave., Chicago, Ill.

Edward G. Seubert, *Chm. Bd.* and *Pres.* Charles J. Barkdull, Allan Jackson, *in chg. Sales;* Edward J Bullock, *in chg. Pur.;* A. W. Peake, *in chg. Prod.*, Max G. Paulus, *in chg. Mfg., V. P.s* Felix T. Graham, *Sec.* Charles J. Barkdull, *Treas.* Amos Ball, *Gen. Mgr. Sales.* Harry F. Glair, *Gen. Mgr. Mfg.* E. J. Shaeffer, Whiting, Ind.; S. A. Montgomery, Wood River, Ill.; R. E. Beard, Sugar Creek, Mo.; H. R. Snow, Neodesha, Kans.; C. C. Buchler, Casper, Wyo.; C. C. Buchler, Greybull, Wyo., *Ref. Supts.* Bruce K. Brown, *Mgr. R.* and *D.* Refineries located at Whiting, Ind.; Wood River, Ill.; Sugar Creek, Mo.; Neodesha, Kans.; Casper, Wyo.; Greybull, Wyo.

Standard Oil Co. of New Jersey, 26 Broadway, New York, N. Y.

F. W. Abrams, *Pres.* C. G. Sheffield, Chester F. Smith, E. A. Holbein, J. C. Hilton, R. L. Hague, *V. P.s.* W. F. Quick, *Sec.* Jay E. Crane, *Treas.* Chester F. Smith, *Gen. Mgr. Ref.* J. R. Carringer, *Asst. Gen. Mgr. Ref.* G. H. Mettam, *Ref. Mgr. N. J. Works.* E. A. Rudigier, *Ref. Mgr. Baltimore and Charleston Works.* M. R. Meacham, Linden, N. J.; W. F. Thiede, Bayonne, N. J.; W. A. Eberle, Jersey City, N. J.; J. F. Ewing, Baltimore, Md.; C. A. Brown, Charleston, S. C., *Asst. Supts.* R. P. Russell, (Standard Oil Development Co.), *Mgr. R. and D.* G. H. B. Davis (Standard Oil Development Co.), *Ch. Chem.* E. H. Barlow (Standard Oil Development Co.), *Ch. Engr.* R. T. Haslam, *Sales Mgr.* J. W. Casterton, *Pur. Agt.* A. G. Phelps, *Traffic Mgr.* Refineries located at New Jersey City, N. J.; Bayonne, N. J.; Linden, N. J.; Baltimore, Md.; Charleston, S. C.

Standard Oil Co. (Ohio Corp.), The, Midland Bldg., Cleveland, Ohio

W. T. Holliday, *Pres.* A. M. Maxwell, A. A. Stambaugh, W. J. Semple, *V. P.s.* F. H. Kelly, *Sec.* W. J. Semple, *Treas.* G. W. Hanneken, *Gen. Mgr. Mfg.* C. H. Metz, Jr., No. 1 Works, Cleveland, Ohio; L. B. Helm, No. 2 Works, Cleveland, Ohio; J. Blake Middleton, Toledo Refinery, Toledo, Ohio; J. R. Cuthbert, Solar Refinery, Lima, Ohio; A. H. Buchanan, Latonia Refining Corp., Latonia, Ky., *Ref. Supts.* I. L. Peterson, No. 1 Works; R. H. Laird, No. 2 Works; C. D. Brown, Toledo Refinery; M. G. Ball, Solar Refinery; S. R. Bolles, Latonia Refining Corp. Dr. R. E. Burk, *Mgr. R. and D.* H. F. West, *Ch. Engr.* F. W. Engle, *Pur. Agt.* Refineries located at Cleveland, Ohio; Toledo, Ohio; Lima, Ohio; Covington, Ky.

Standard Oil Co. of Texas, 225 Bush St., San Francisco, Calif.

W. H. Berg, *Pres.* R. W. Hanna, R. K. Davies, M. E. Lombardi, G. E. Kennedy, *V. P.s.* J. H. Tuttle, *Sec.* V. F. Palmer, *Treas.* Refinery located at El Paso, Tex.

Stanolind Oil & Gas Co., Philcade Bldg., Tulsa, Okla.

A. W. Peake, *Chm. Bd.* F. O. Prior, *Pres.* E. F. Bullard, A. M. McCorkle, *V. P.s.* F. J. Keleher, *Sec.* and *Treas.* P. G. Weidner, *Supt. Ref.* O. W. White, *Ref. Supt.* James Means, *Asst. Supt.* E. J. Yocom, *Ch. Chem.* W. L. James, *Pur. Agt.* Refinery located at Superior, La.

Starlight Refining Co., Inc., P. O. Box S, Ballinger, Tex.

Art Tucker, *Pres.* George A. Sonricker, *V. P.* and *Gen. Mgr.* Roy Duke, *Sec.* Refinery located at Ballinger, Tex.

State Line Refining Co., Mitchell, Neb.

Refinery located at Mitchell, Neb.

State Refining Co., Grand Rapids, Mich.

E. L. Wellman, *Pres.* R. F. Glocheski, *Sec.* E. G. Guy, *Gen. Supt. Ref.* Refinery located at Grand Rapids, Mich.

Steiner, Walter, Refining Co., 2132 South St., Long Beach, Calif.

Walter Steiner, *Pres.* Adelaide Steiner, *Sec.* and *Treas.* Refinery located at Long Beach, Calif.

Stephens Refining Co., Stephens, Ark.

W. B. Hassett, *Pres.* R. H. Hassett, *Treas.* and *Gen. Mgr. Ref.* Refinery located at Stephens, Ark.

Stockton Oil Co., Inc., 405 Montgomery St., San Francisco, Calif.

G. H. Corse, Jr., *Pres.* and *Treas.* E. H. Orr. *Sec.* Refinery located at Stockton, Calif.

Stoll Oil Refining Co., 227 W. Main St., Louisville, Ky.

C. C. Stoll, *Pres.* George Stoll, Berry V. Stoll, Charles E. Stoll, *V. Ps.* William A. Stoll, *Sec.* and *Treas.* Berry V. Stoll, *Gen. Mgr. Ref.* J. W. Kittner, *Gen. Supt. Ref.* George Kittner, *Asst. Supt.* Clem Luce, *Proc. Supt.* and *Mgr. R. and D.* Cecil Baugh, *Ch. Engr.* J. T. Crowdus, *Pur. Agt.* Refinery located at Louisville, Ky.

Stone Oil Co., 2115 Second National Bank Bldg., Houston, Tex.

R. W. Stone, *Pres.* and *Pur. Agt.* H. M. Stone, *V. P.* and *Gen. Mgr. Ref.* Adelaide LaCombe, *Sec.* and *Treas.* E. A. Johnson, *Ref. Supt.* W. A. Maddox, *Asst. Supt.* Oran Johnson, *Ch. Chem.* R. W. Stone, *Pur. Agt.* Refinery located at Texas City, Tex.

Sturgis Refining Co., Sturgis, S. D.

Charles Brodsky, *Pres.* and *Sales Mgr.* Ralph E. Williams, *Treas.* H. J. Brodsky, *Ch. Chem.* Leo Kranz, *Supt.* Refinery located at Sturgis, S. D.

Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.

J. Howard Pew, *Pres.* J. N. Pew, Jr., J. Edgar Pew, S. B. Eckert, A. E. Pew, Jr., *V. P.s.* Frank Cross, *Sec.* and *Treas.* W. D. Mason, Marcus Hook, Pa.; H. O. Cameron, Toledo, Ohio; C. B. Carter, Yale, Okla., *Ref. Supts.* Dr. J. B. Hill, *Mgr. R. and D.* Henry Thomas, *Pur. Agt.* Refineries located at Marcus Hook, Pa.; Toledo, Ohio; Yale, Okla.

Sunray Oil Co., Philtower Bldg., Tulsa, Okla.

C. H. Wright, *Pres.* F. L. Martin, P. E. Taliaferro, H. H. Mack, *V. P.s.* W. D. Forster, *Sec.* L. W. Bennett, *Treas.* F. L. Martin, *V. P. Chg. Ref.* R. L. Johnson, *Ref. Supt.* A. D. Vinson, *Asst. Supt.* Roy France, *Ch. Chem.* Ralph Campbell, *Pur. Agt.* Refinery located at Allen, Okla.

Super Asphalt Products Co., The, 2990 Pine Ave., Long Beach, Calif.

W. H. Geis, *Pres.* Wm. Fred Scherer, *Sec.* Stephen F. Underwood, *Treas.* Wirt D. Rial, *Gen. Mgr.* C. A. Quinn, *Sales Mgr.* James Ormsby, *Ch. Engr.* William K. Neales, *Ch. Chem.* Refinery located at Long Beach, Calif.

Superior Oil Works, Warren, Pa.

R. Z. Morrison, *Pres.* W. F. Clinger, *V. P.* and *Treas.* C. H. Eaton, *Sec.* and *Pur. Agt.* O. E. McLeieer, *Gen. Mgr.* H. G. Eaton, *Gen. Supt. Ref.* R. B. Allmendinger, *Asst. Supt.* and *Ch. Chem.* Refinery located at Warren, Pa.

Sweet Oil Refining Co., Wyman, Mich.

Ray Andres, *Pres.* and *Gen. Mgr. Ref.* Albert Kessler, *V. P.* Lloyd Wheeler, *Sec.-Treas.* Floyd Bacon, *Ref. Supt.* Refinery located at Wyman, Mich.

T

Talco Asphalt & Refining Co., P. O. Box 1011, Mount Pleasant, Tex.

Joe Dranguet, *Auditor.* J. K. MacKinnon, *Gen. Mgr.* C. O. Garbrecht, *Gen. Supt. Ref.* T. W. Trelford, *Traffic Mgr.* John S. Williams, *Mgr. Asphalt Sales.* Bryson B. Hamilton, *Mgr. Light Oil Sales.* A. C. Johnson, *Ch. Chem.* J. C. Reed, *Ch. Engr.* Robert B. Slay, *Pur. Agt.* Refinery located at Mount Pleasant, Tex.

Taylor Refining Co., P. O. Box 1039, Taylor, Tex.

G. L. Rowsey, *Pres.* and *Gen. Mgr.* Ben H. Harrison, *V. P.* and *Treas.* Harris A. Melasky, *Sec.* H. M. Wilson, *Ch. Chem.* J. B. Mayo, *Supt.* Refineries at Taylor and Corpus Christi, Tex.

Telegraph Refining Corp., P. O. Box 343, Compton, Calif.

Refinery located at Compton, Calif.

Terminal Refining Corp., P. O. Box 1369, Corpus Christi, Tex.

T. E. McArdle, *Pres.* and *Gen. Mgr. Ref.* C. M. Hall, *Sec.* and *Treas.* Paul F. McArdle, *Gen. Supt. Ref.* and *Pur. Agt.* J. E. McArdle, *Asst. Supt.* and *Ch. Chem.* Refinery located at Corpus Christi, Tex

Texas Co., The (California), 929 S. Broadway, Los Angeles, Calif.

C. E. Olmsted, *Pres.* T. H. Webb, *V. P.* and *Gen. Mgr.* R. T. Herndon, L. R. Holmes, *V. Ps.* R. L Saunders, New York City, *Sec.* C. E. Woodbridge, New York City, *Treas.* L. R. Holmes, *V. P. Ref. Dept.* W. J. Ryan, Los Angeles, Calif.; J. R. Scanlin, Fillmore, Calif., *Supts.* A. F. Colling, *Mgr. Pur. Dept.* Refineries located at Los Angeles, Calif.; Fillmore, Calif.; Coalinga, Calif.

Texas Co., The (Delaware), 135 E. Forty-second St., New York, N. Y.

T. Rieber, *Chm. Bd.* W. S. S. Rodgers, *Pres.* H. W. Dodge, T. J. Donoghue, H. T. Klein, J. S. Leach, F. T. Manley, G. L. Noble, R. Ogarrio; C. E. Olmsted, *V. P.s.* R. L. Saunders, *Sec.* C. E. Woodbridge, *Treas.* C. E. Olmsted, *V. P. Ref. Dept.* F. P. Dodge, *Gen. Supt.*, Port Arthur, Tex.; F. S. Dengler, Port Neches, Tex.; S. W. Darling, Houston, Tex.; R. G. Collins, West Dallas, Tex.; W. K. Holmes, West Tulsa, Okla.; G. B. Bogart, Lockport, Ill.; R. H. Donaldson, Shreveport, La.; H. C. Wakefield, Pryse, Ky.; A. E. Higgs, San Antonio, Tex.; G. C. McSwain, Amarillo, Tex.; H. A. Fouts, El Paso, Tex.; L. F. J. Wilking, Casper, Wyo.; W. A. Martin, Calpet, Wyo.; G. O. Shefstead, Craig, Colo.; C. J. King, Cody, Wyo.; J. C. Edwards, Sunburst, Mont.; J. R. Reed, Norfolk, Va.; C. G. Cramer, Claymont, Del.; V. B. Pevoto, Providence, R. I., *Supts. Ref.* A. F. Colling, *Pur. Agt.* Refineries located at Port Arthur, Tex.; Port Neches, Tex.; Shreveport, La.; Houston, Tex.; West Dallas, Tex.; San Antonio, Tex.; El Paso, Tex.; Amarillo, Tex.; West Tulsa, Okla.; Pryse, Ky.; Lockport, Ill.; Casper, Wyo.; Craig, Colo.; Cody, Wyo.; Calpet, Wyo.; Sunburst, Mont.; Norfolk, Va.; Claymont, Del.; Providence, R. I. (Calpet, Wyo. plant operates as California Petroleum Corp. of Utah; Sunburst, Mont., plant operates as International Refining Co.).

Texas Oil Products Co., Gladewater, Tex.

Refinery located at Gladewater, Tex.

Texas Pacific Coal & Oil Co., P. O. Box 2110, Fort Worth, Tex.

W. K. Gordon, *Chm. Bd.* J. R. Penn, *Pres.* O. E. Mitchell, C. E. Yager, *V. P.s.* R. Seibel, *Sec.* and *Treas.* O. E. Mitchell, *Gen. Mgr. Ref.* D. B. Hiatt, *Gen. Supt. Ref.* C. S. Bronstad, H. D. White, *Ref. Supts.* D. J. Costa, *Engr.* J. C. Davis, *Buyer.* Refinery located at Caddo, Tex.

Tide Water Associated Oil Co., 17 Battery Place, New York City, N. Y.

William F. Humphrey, *Chm. Bd.* and *Pres.* C. R. Barton, L. F. Bayer, J. D. Collins, L. C. Decius, B. I. Graves, G. J. Hanks, L. D. Jurs, R. B. Pringle, Noel Robinson, R. E. Ryerson, E. H. Sairin, *V. P.s* J. P. Edwards, *Exec. Sec.* W. J. Burker, *Sec.* K. R. Hankinson, *Treas.* C. R. Barton, Tide Water Division; L. F. Bayer, Associated Division, *V. P.s Chg. Mfg.* H. S. Chase, Tide Water Division; T. O. Edwards (Avon); D. D. Stark (Watson), Associated Division; L. M. Jagou, Mid-Continent Division, *Supts. Ref.* G. C. Caine, Tide Water Division, *Asst. Supt.* F. W. Keebler, Tide Water Division; O. Larson, Associated Division, *Proc. Supts.* J. T. McCoy, Tide Water Division; H. Y. Hyde, Associated Division, *Supervisors of R.* and *D.* D. Rothbard, L. Mittelman, R. W. Boyd, *Ch. Chems.* R. S. Stanfield, I. G. Reed, O. A. Gierow, *Ch. Engrs.* A. Jungdahl, A. P. MacKillop, M. F. Bridges, *Pur. Agts.* Refineries located at Bayonne, N. J.; Drumright, Okla.; Avon, Calif.; Watson, Calif.

Tower Refining Co., Overton, Tex.

Dick Duncan, *Pres.* C. W. Curtis, *V. P.* R. T. Bowen, *Sales Mgr.* Refinery located at Overton, Tex.

Tri State, Inc., Thermopolis, Wyo.

J. H. Walden, *Chm. Bd.* Mrs. J. H. Walden, *Sec.* Zollie Ross Walden, *Treas.* J. H. Walden, *Gen. Mgr. Ref.* and *Pur. Agt.* C. F. Koenig, *Gen. Supt. Ref.* and *Ch. Engr.* M. J. Johnson, *Asst. Supt.* G. R. Stephens, *Mgr. R.* and *D.* and *Ch. Chem.* Refinery located at Thermopolis, Wyo.

Triangle Oil & Refining Co., Box 325, Venice, Calif.

G. A. Lathrop, *Pres.* L. W. Frankley, *V. P.* C. W. Allison, *Sec.* and *Treas.* and *Gen. Mgr. Ref.* L. R. Taylor, *Gen. Supt. Ref.* Refinery located at Venice, Calif.

Troy Refining Corp., Troy, Ind.

Auburn Stinson, *Pres.* C. D. Schriefer, *V. P.* Dewey Stinson, *Sec., Treas.* and *Gen. Mgr.* Refinery located at Troy, Ind.

Trumbull Asphalt & Refining Co., Chicago, Ill.

R. B. Smith, *Chm. Bd.* G. F. Chase, *Pres.* H. F. Alexander, *V. P.* W. K. Graham, *Sec.* and *Treas.* Refinery located at Alma, Mich.

Tucker Oil Co., 1210 City National Bank Bldg., Wichita Falls, Tex.

J. J. Perkins, *Pres.* Charles J. Tucker, *V. P.* and *Gen. Mgr. Ref.* Harold Murph, *Sec.* and *Treas.* Roy E. Wood, *Gen. Supt. Ref.* and *Pur. Agt.* Refinery located in Wichita County, Texas.

U

Ultra-Penn Refining Co., Bruin, Pa.

Grant M. Lyons, *Gen. Mgr. Ref.* C. J. McCorry, *Rcf. Supt.* W. R. Storey, *Ch. Chem.* W. J. Davenport, *Ch. Engr.* and *Pur. Agt.* Refinery located at Bruin, Pa.

Ultra-Penn Refining Co., Bruin, Pa.

William H. Miller, *Receiver.* Grant M. Lyons, *Gen. Mgr. Ref.* W. R. Storey, *Ch. Chem.* W. J. Davenport, *Ch. Engr.* S. L. Gehr, *Pur. Agt.* Refinery located at Bruin, Pa.

Union Oil Co. of California, 617 W. Seventh St., Los Angeles, Calif.

L. P. St. Clair, *Chm. Bd.* Reese H. Taylor, *Pres.* R. D. Matthews, W. L. Stewart, Jr., Paul M. Gregg, A. C. Rubel, V. H. Kelly, A. C. Galbraith, *V. P.s* A. C. Stewart, *Asst. V. P.* J. M. Rust, *Treas.* A. C. Marshall, H. W. Sanders, *Asst. Treas.s* W. R. Edwards, *Sec.* E. H. Estill, *Asst. Sec.* M. G. Kerr, *Comptroller.* A. B. Mason, I. J. Hancock, *Asst. Comptrollers.* L. G. Metcalf, *Gen. Mgr. Ref.* N. F. Myers, *Gen. Supt. Ref.* John Salmond, Wilmington, Calif.; J. M. Holden, Oleum, Calif.; H. Ambrozier, Bakersfield, Calif.; R. W. Frazier, Avila, Calif., *Ref. Supts.* E. W. Gard, *Mgr. R. and D.* Dr. D. R. Merrill, *Ch. Chem.* H. C. Farquhar, *Pur. Agt.* Refineries located at Wilmington, Calif.; Oleum, Calif., Bakersfield, Calif.; Santa Paula, Calif.; Avila, Calif.

United Refining Co., Warren, Pa.

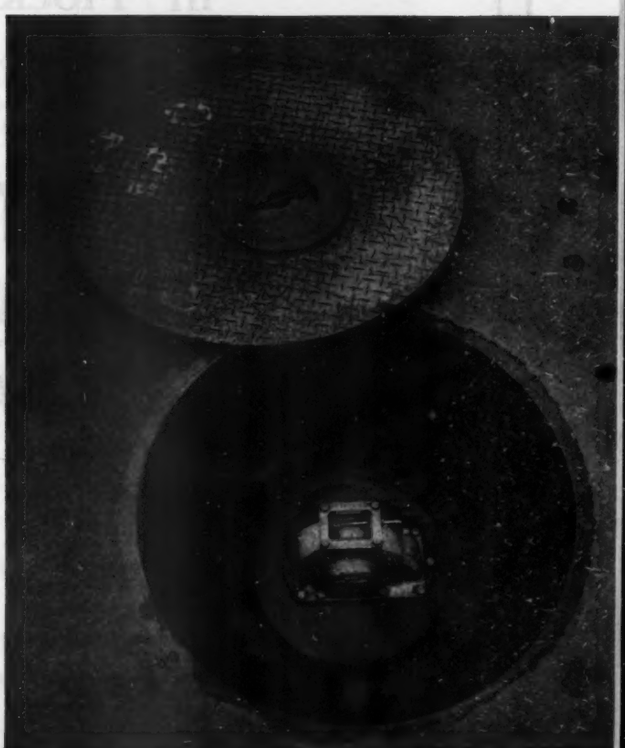
F. G. Bannerot, *Pres.* H. A. Logan, *V. P.* and *Treas.* H. W. Schmidt, *Sec.* MacLean Houston, *Gen. Supt. Ref.* Refinery located at Warren, Pa.

EAST BAY TRANSIT COMPANY
Checks Gas with S & J Gauges

If you sell or use large quantities of gasoline and an accurate knowledge of your storage, purchases and withdrawals is of importanee to you, do as the East Bay Transit Company of Oakland, California does, check your gasoline with an S. & J. Automatic Tank Gauge.

Automatic gauging is safer, faster, more accurate and more economical than manual gauging. S. & J. offers a complete line of automatic gauges for storage ashore or afloat; above ground or below; under high or low pressure; in vertical or horizontal tanks.

Tell us your problem and we will gladly submit our recommendations.



SHAND & JURS CO.
BERKELEY, CALIFORNIA
295 Madison Avenue, New York
225 W. 11th Street, Los Angeles
601 Fannin Street, Houston
565 West Washington Boulevard, Chicago

SHAND & JURS

„Klinger-Oilit"

The most reliable and lasting

JOINTING

For

Petroleum, Benzine, Oil

and

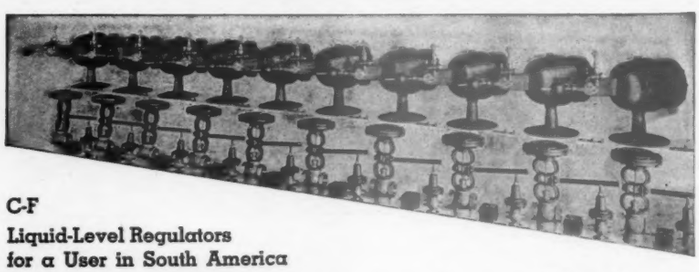
all Hydro-Carbons

KLINGER VALVES

For Tank Wagons.

No flat or mitre seats,
Long lasting leak-free service,
Reliable in operation
Simple Construction.

RICH. KLINGER A. G. VIENNA - GUMPOLDSKIRCHEN



C-F
Liquid-Level Regulators
for a User in South America

These Regulators Are Ordered in "Flocks"

The C-F Vigilant Liquid-Level Regulator has so wide a range of usefulness and does what it is designed to do so effectively that customers often find occasion to order a number at one time. In cracking stills, bubble towers, vaporizers, and the like, liquid levels are perfectly maintained by use of such regulators. Ask for Bulletin 3113—also catalog of C-F Regulators for all requirements of pressure-control.

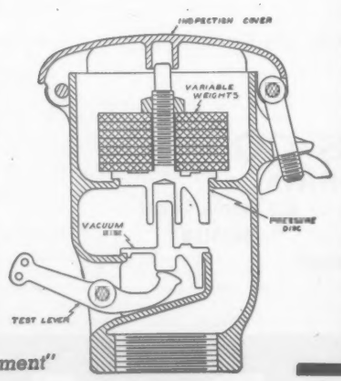
The CHAPLIN-FULTON MFG. CO.

28-40 PENN AVE. CF PITTSBURGH, PA.

ENARDO Vacuum Pressure TANK EQUIPMENT

Vent Line Stack Valve!

. . . controls vacuum pressure of individual tanks or battery. Assembles on top of vent line. Easy inspection provided by hinged cover plate held by thumbscrew. Seating action simply checked from ground by rope attached to test lever on atmospheric side of valve. Pressure variable from 1½ to 16 oz. pressure. For detailed information, write for descriptive literature.



"Enardo Equipment will conserve enough of the rich vapors to pay for themselves in a short time."

ENARDO FDY. & MFG. CO. Tulsa, Oklahoma
2729 SAND SPRINGS ROAD

"There Is an Enardo Valve For Every Tank Requirement"

Unity Petroleum Corp., P. O. Box 391, Shelby, Mont.
Boris A. S. Aronow, *Chm. Bd.* and *Pres.* M. Anderson, *Sec.* E. J. Landry, Kalispell, Mont., *Gen. Mgr. Ref.* Willard Aronow, *Ch. Chem.* Boris A. S. Aronow, *Treas.* and *Pur. Agt.* Refinery located at Kalispell, Mont.

Universal Refineries, Inc., 513 Amarillo Bldg., Amarillo, Tex.
John A. Harris, *Pres.* E. Byron Singleton, *V. P.* R. G. Windsor, *Sec.* and *Treas.* H. F. Newman, *Gen. Supt. Ref.* Refineries located at Artesia, N. M., and Pueblo, Colo.

Utah Oil Refining Co., P. O. Box 898, Salt Lake City, Utah
T. A. Dines, *Pres.* Wm. R. Wallace, E. S. Holt, A. N. Johnson, M. J. Greenwood, *V. P.s.* A. N. Johnson, *Sec.* and *Treas.* F. R. Clark, *Ref. Supt.* R. C. Watkins, *Proc. Supt.* A. W. Neeley, *Mgr. R.* and *D.* G. I. Kirby, *Ch. Chem.* Robert G. Clark, *Ch. Engr.* Keros H. Searle, *Pur. Agt.* Refinery located at Salt Lake City, Utah.

Utah Parks Petroleum Co., Virgin, Utah.
Edward D. Dunn, *Pres.* W. M. V. Carpenter, *V. P.* C. E. Cline, *Sec.* and *Treas.* Refinery located at Virgin, Utah.

V

Valley Refining Co., E. College Blvd., Roswell, N. M.
S. W. Lodewick, *Pres.* and *Sales Mgr.* H. C. Buchly, *V. P.* S. P. Johnson, Jr., *Sec.* and *Treas.* J. G. Danforth, *Ch. Chem.* E. A. Wahline, *Supt.* Refinery located at Roswell, N. M.

Valley Refining Co., Harlingen, Tex.
A. B. White, *Gen. Mgr. Ref.* J. E. Day, *Gen. Supt. Ref.* and *Ch. Chem.* A. B. White, *Mgr. R. and D.* and *Pur. Agt.* Refinery located at Harlingen, Tex.

Valley Refining Co., P. O. Box 11, Harlingen, Tex.
A. B. White, *Gen. Mgr. Ref., Mgr. R. and D.,* and *Pur. Agt.* J. E. Day, *Gen. Supt. Ref., Ch. Chem.* and *Ch. Engr.* Refinery located at Harlingen, Tex.

Valvoline Oil Co., Fifth and Butler Sts., Cincinnati, Ohio.
E. W. Edwards, *Chm. Bd.* G. P. Dall, *Pres.* C. I. Leroux, C. C. Gould, C. W. Luton, J. M. Marshall, J. H. Garlough, H. M. Hart, *V. P.s* C. C. Gould, *Sec.* C. J. Leroux, *Treas.* C. W. Luton, *Gen. Mgr. Ref.* C. M. Noyes, Butler, Pa., *Supt.* A. S. Hagan Butler, Pa., *Asst. Supt.* H. W. Winkler, Franklin, Pa., *Supt.* L. A. Calkins, *Mgr. R.* and *D.* E. H Shepherd, *Pur. Agt.* Refineries located at Butler, Pa.; Franklin, Pa.; Warren, Pa.

Vickers Petroleum Co., P. O. Box 2240, Wichita, Kans.
J. A. Vickers, *Chm. Bd.* C. L. Henderson, *V. P.* and *Gen. Mgr. Ref.* John S. Wertz, *Sec.* and *Treas.* A. M. Schrepfer, *Gen. Supt. Ref.* R. N. Moore, *Asst. Supt.* W. L. Proctor, *Ch. Chem.* H. G. Shaw, *Pur. Agt.* Refinery located at Potwin, Kans.

W

Waggoner Refining Co., P. O. Box 2100, Vernon, Tex.
E. L. Waggoner, Mosquero, N. M., *Pres.* E. P. Waggoner, Fort Worth, Tex.; A. B. Wharton, Fort Worth, Tex., *V. P.s.* R. L. More, *Sec.* and *Treas.* C. A. Hodges, *Gen. Mgr.* V. U. Cloer, *Chem.* J. T. McNamara, *Pur. Agt.* J. B. Simpson, *Supt.* Refinery located at Electra, Tex.

Warr-Penn Refining Co., Warren, Pa.
E. W. Campbell, *Pres.* L. B. Schofield, Philadelphia, Pa., *V. P.* E. N. Jacobson, *Sec.* George W. Campbell, *Treas.* and *Gen. Mgr.* Christ Petersen, *Gen. Supt. Ref.* Gerald Peck, *Ch. Engr.* Refinery located at Warren, Pa.

Wasatch Oil Refining Co., Woods Cross, Utah.
William H. McIntyre, *Pres.* Henry D. Moyle, *V. P.* C. G. Davis, *Sec.* William Yeates, *Treas.* and *Gen. Mgr. Ref.* Claude B. Owen, *Gen. Supt. Ref.* and *Pur. Agt.* A. A. Hale, *Asst. Supt.* G. P. Hibler, *Ch. Chem.* Refinery located at Woods Cross, Utah.

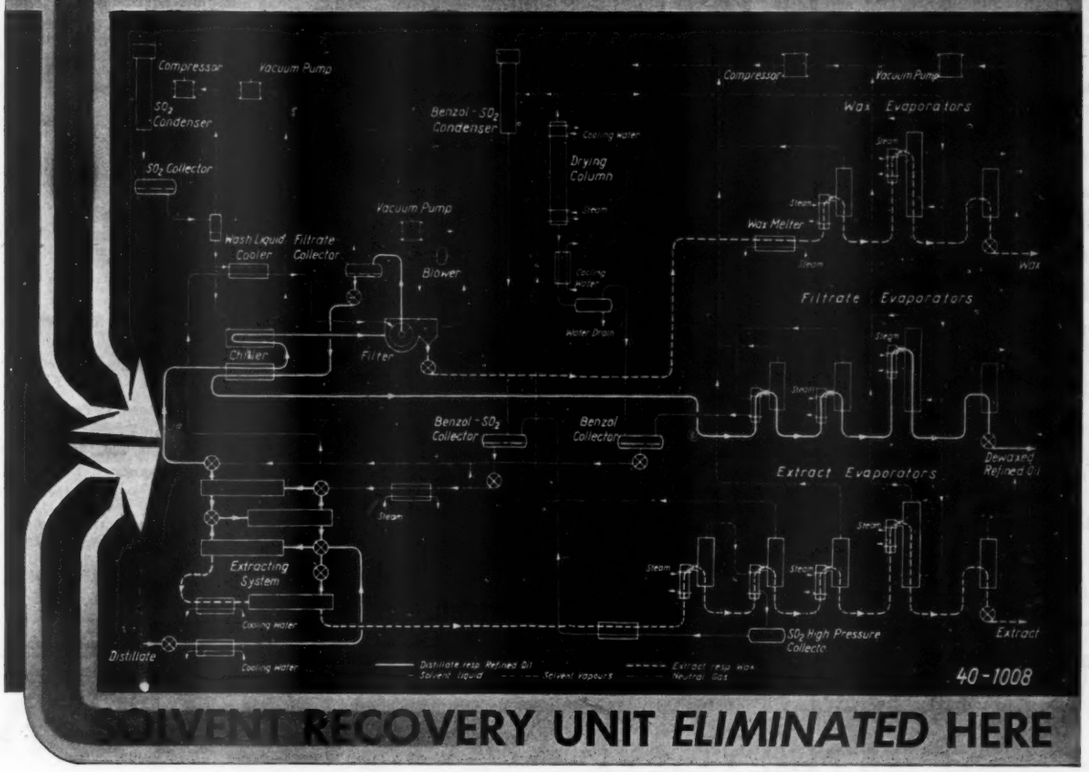
Waverly Oil Works Co., Fifty-fourth St. & A.V.R.R., Pittsburgh, Pa.
S. M. Vockel, *Chm. Bd.* and *Pres.* W. H. Millhiser and F. W. Wappat, *V. P.s.* T. A. Walker, *Sec.* M. Mitchell, *Asst. Sec.* S. K. Cunningham, *Treas.* W. H. Millhiser, *Gen. Mgr. Ref.* and *Pur. Agt.* Cory James, *Asst. Supt.* Dr. W. T. Sieber, *Mgr. R. and D.* and *Ch. Chem.* A. J. Bevevino, *Ch. Engr.* Refinery located at Pittsburg, Pa.

Western Refining Co., Corsicana, Tex.
J. T. Eady, *Gen. Mgr.* Refinery located at Baldridge Switch, Fort Stockton, Tex.

White Wing Refining Co., Inc., Sullivan City, Tex.
T. C. Anderson, *Pres.* J. F. Roark, *V. P.* and *Sales Mgr.* Ed W. Sullivan, *Sec.* and *Treas.* Cotton Gilmore, *Ch. Engr.* Refinery located at Sullivan City, Tex.

Whitman, A. J., Refinery, Le Roy, Wyo.
A. J. Whitman, *Owner.* Refinery located at Le Roy, Wyo.

SAVE on plant investment and operating costs with EDELEANU COMBINATION PROCESS



SOLVENT RECOVERY UNIT *ELIMINATED* HERE

EDELEANU PLANTS

operating and under construction in:

Argentina
Aruba Island
Bahrein Island
British India
England
France
Germany
Italy
Iran
Mexico
Netherlands East Indies
Poland
Roumania
Scotland
Trinidad
United States of America
Venezuela

Lubricating oils of high stability, high viscosity index and low pour point are produced by the Edeleanu Process, using the same solvents for extracting and dewaxing.

This exclusive feature permits the charging of refined waxy oil directly into the dewaxing unit, and thus eliminates one complete evaporation system. The number of solvent recovery units is thereby reduced from four to three in the combined process—a substantial saving is effected.

Edeleanu Processes are commercially used throughout the world for the refining of naphtha, kerosene, light, medium and heavy lubricating oils.

EDELEANU COMPANY LIMITED
551 FIFTH AVENUE
NEW YORK CITY, N. Y.

EDELEANU-G. M. B. H.
MARTIN LUTHER STR. 61-66
BERLIN-SCHOENEBERG, GERMANY

Wickett Refining Co., Wickett, Tex.

W. B. Hassett, Box 55, Clayton, Mo., *Pres.* R. H. Hassett, *V. P.* and *Pur. Agt.* C. C. Green, *Sec.* S. H. Fredericks, *Treas.* H. H. Fulenwider, *Ch. Chem.* Jack Strickler, *Supt.* Refinery located at Wickett, Tex.

Wilcox, H. F., Oil & Gas Co., Box 1440, Tulsa, Okla.

H. F. Wilcox, *Pres.* F. H. Dunn, *V. P.* M. P. Appleby, *V. P.* and *Treas.* C. L. Miller, *Sec.* and *Asst. Treas.* J. L. Keefe, *Asst. Sec.* W. M. Fraser, *Gen. Supt. Ref.* W. R. Bingham, *Ch. Engr.* George Brooks, *Ch. Chem.* J. M. Clover, *Supt. Ref.* Refinery located at Bristow, Okla.

Wilshire Oil Co., Inc., 2455 E. Twenty-seventh St., Los Angeles, Calif.

George L. Machris, *Pres.* Maurice A. Machris, *V. P.* and *Gen. Mgr.* Alfred P. Machris, *Sec.* and *Treas.* William J. Neely, *Ch. Engr.* Fred Scherf, *Ch. Chem.* A. A. Pateracki, *Pur. Agt.* Refinery located at Norwalk, Calif.

Wolverine-Empire Refining Co., Box 56, Oil City, Pa.

C. H. Ellingwood, *Chm. Bd.* E. W. Chase, *Pres.* A. W. Scott, F. W. Baer, *V. P.s.* A. W. Scott, *Sec.* F. W. Baer, *Treas.* A. W. Cole, *Gen. Supt. Ref.* W. J. Scott, *Pur. Agt.* Refinery located at Reno, Pa.

Wood-Moore Corp., Port Lavaca, Tex.

Walter H. Payne, Jr., *Receiver.* Plant located at Port Lavaca, Tex.

Worth Refining Co., 624 S. Michigan Ave., Chicago, Ill.

T. F. Thompson, *Pres.* George E. Phoenix, *V. P.* E. V. Rehberg, *Sec.* and *Treas.* Howard Wilson, *Ref. Supt.* Max Cosby, *Asst. Supt.* Refinery located at Blue Island, Ill.

Yale Oil Corp., Billings, Mont.

L. B. Hancock, *Pres.* and *Treas.* P. N. Fortin, *V. P* and *Sec.* and *Gen. Mgr. Ref.* C. J. Mowery, Billings, Mont.; Willard Shaw, Lovell, Wyo.; Clayton Burke, Kalispell, Mont.; Nels Rawstern, Worland, Wyo., *Gen. Supts.* L. W. Corbett, *Mgr. R.* and *D.* T. R. Corbett, *Ch. Chem.* and *Ch. Engr.* Refineries located at Billings, Mont.; Kalispell, Mont.; Lovell, Wyo.; Worland, Wyo.

Yosemite Oil Refining Co., P. O. Box 205, Bakersfield, Calif.

Curtis Flint, *Pres.* and *Treas.* Hattie P. Flint, *V. P.* C. S. Fite, *Sec.* and *Sales Mgr.* Louis Steneman, *Supt.* Refinery located at Fruitvale, Calif.

Personnel of Refineries in Canada

A

Anglo-Canadian Oils, Ltd., P. O. Box No. 99, Brandon, Manitoba, Canada.

W. S. Campbell, *Pres.* F. P. Byrne, *V. P.* R. J. Christian, *Gen. Mgr. Ref.* Refinery located at Brandon, Manitoba, Canada.

B

Bell Refining Co., Ltd., 1202 First St., West, Calgary, Alberta, Canada.

R. A. Brown, *V. P.* M. R. Smith, *Sec.* and *Treas.* T. W. McKee, *Gen. Mgr. Ref.* M. T. Stevens, *Supt.* Refinery located at Calgary, Alberta, Canada.

British American Oil Co., Ltd., The, Royal Bank Bldg., Toronto, Ontario, Canada.

A. L. Ellsworth, *Pres.* F. A. Gaby, C. L. Suhr, *V. P.s* H. H. Bronsdon, *Sec.* J. C. Millar, *Treas.* L. E. Woolley, *Gen. Mgr. Ref.* D. W. Monroe, Toronto; H. E. Saunders, Montreal; J. K. Jamieson, Moose Jaw; G. H. Lambert, Turner Valley absorption plant, *Ref. Supts.* R. O. Campbell, *Ch. Chem.* C. D. Read, *Ch. Engr.* J. E. Joyce, *Pur. Agt.* Refineries located at Toronto, Ontario; Monteral, Quebec; Moose Jaw, Saskatchewan; Coutts, Alberta; Calgary, Alberta, Canada.

Burlington Refineries, Ltd., Burlington St., East, Hamilton, Ontario, Canada.

S. J. Sackett, *Pres.* G. J. Gibson, *V. P.* and *Gen. Mgr.* T. H. Simpson, *Sec.* T. Boutilier, *Gen. Supt. Ref.* Refinery located at Hamilton, Ontario, Canada.

C

Canadian Oil Companies, Ltd., 12 Strachan Ave., Toronto, Ontario, Canada.

F. H. Littlefield, *Pres.* and *Gen. Mgr.* W. H. Lamprecht, F. C. West, *V. P.s* H. F. Hoecker, *Sec.* C. W. Walker, *Treas.* E. A. Smith, *Gen. Supt. Ref.* G. S. Middaugh, *Pur. Agt.* C. E. Wilfong, *Traf. Mgr.* Refinery located at Petrolia, Ontario, Canada.

Canadian Oil Companies, Ltd., 12 Strachan Ave., Toronto, Ontario, Canada.

F. H. Littlefield, *Pres.* and *Gen. Mgr.* W. H. Lamprecht, F. C. West, *V. P.s.* H. F. Hoecker, *Sec.* C. W. Walker, *Treas.* E. A. Smith, *Gen. Supt. Ref.* G. S. Middaugh, *Pur. Agt.* Refinery located at Petrolia, Ontario, Canada.

Champlain Oil Products, Ltd., Sun Life Bldg., Montreal, Quebec, Canada.

Harry Snyder, *Chm. Bd.* F. T. McKean, *Pres.* J. E. L. Duquet, *Sec.* F. E. Smith, *Treas.* J. O. Tremblay, *Sales Mgr.* Refinery located at Montreal, Quebec, Canada.

Consumers Co-Operative Refineries, Ltd., P. O. Box 398, Regina, Saskatchewan, Canada.

E. E. Frisk, *Pres.;* C. O. Smith, W. H. Johnstone V. C. Thomas, *V. P.s* H. L. Fowler, *Sec.* and *Treas.* O. B. Males, *Gen. Supt. Ref.* and *Mgr. R.* and *D.* S. C. McClelland, *Ch. Chem.* E. T. Mowbrey, *Pur. Agt.* Refinery located at Regina, Saskatchewan, Canada.

E

Easton Refining Co., Ltd., Easton, Saskatchewan, Canada.

William Hollar, *Pres.* H. B. Larson, *Sec.* H. C. Spaetgens, *Gen. Supt. Ref.* Refinery located at Easton, Saskatchewan, Canada.

F

Fraser, J. W., Refining Co., Wainwright, Alberta, Canada.

J. W. Fraser, *Owner.* Refinery located at Wainwright, Alberta, Canada.

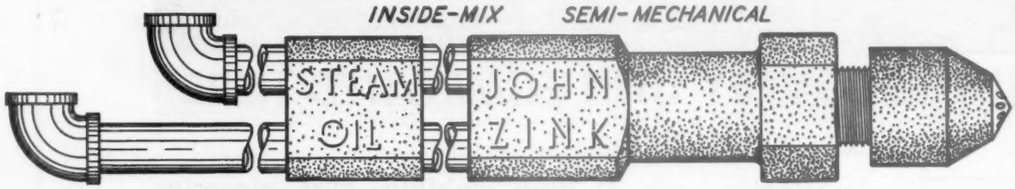
G

Gas & Oil Products, Ltd., 300 Lancaster Bldg., Calgary, Alberta, Canada.

A. H. Mayland, *Pres.* Harvey Price, *V. P.* William Kemp, *Sec.* L. A. Boyd, *Gen. Mgr. Ref.* and *Pur. Agt.* M. Neilson, *Asst. Supt.* W. G. Fisher, *Ch. Chem.* Refinery located at Hartell, Alberta, Canada.

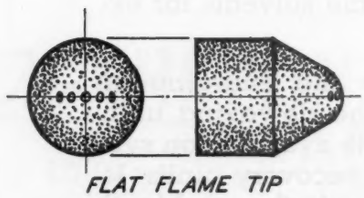
Gold Standard Oils, Ltd., Wainright, Alberta, Canada.

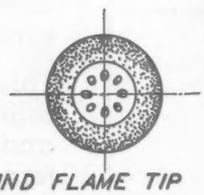
W. B. Underhill, *Pres.* M. R. Cowell, *V. P.* W. A.



It's New

TWO-WAY OIL BURNER





STEAM ATOMIZING • MECHANICAL ATOMIZING

This burner can be furnished with two heads and can be used as a mechanical atomizing burner or as our semi-mechanical steam atomizing burner by simply changing heads. The mechanical head is a tangential slot swirl type and the steam atomizing head may be drilled to produce type of flame specified.

Wall thimbles or air registers of the proper size can be furnished as extra equipment. The oil gun will pass through standard 2" pipe and such pipe can be used as a guide or support to hold it in wall thimbles or other types of burner openings.

"SHORTEST FLAME OIL, GAS, AND COMBINATION OIL & GAS BURNERS IN THE WORLD"

JOHN ZINK BURNERS — JOHN ZINK BURNERS — TULSA, OKLAHOMA

342 MADISON AVENUE, NEW YORK — 4401 SOUTH PEORIA

Keenan, *Sec.* and *Treas.* and *Pur. Agt.* M. R. Cowell, *Gen. Mgr. Ref.* J. L. Howes, *Ref. Supt.* F. J. Werth, *Ch. Chem.* C. A. McDonald, *Ch. Engr.* Refinery located at Wainright, Alberta, Canada.

Good Rich Refining Co., Ltd., Port Credit, Ontario, Canada

R. Rosefield, *Chm. Bd.* and *Pres.* J. H. Davis., *V. P., Sec.* and *Treas.* F. K. Davis, *Gen. Mgr. Ref.* and *Ch. Engr.* C. W. Mathews, *Pur. Agt.* Refinery located at Port Credit, Ontario, Canada.

H

Hi-Way Refineries, Ltd., 714 Broder Bldg., Regina, Sask., Canada

S. J. Sackett, *Pres.* A. E. O'Brien, *V. P.* and *Gen. Mgr. Ref.* T. B. Bagslaw, *Sec.* L. C. Slater, *Treas.* J. A. Kelley, *Gen. Supt. Ref.* Refineries located at Regina, Saskatchewan; Moose Jaw, Saskatchewan; Saskatoon, Saskatchewan; Swift Current, Saskatchewan; Prince Albert, Saskatchewan; Weyburn, Saskatchewan; Rosetown, Saskatchewan; South Edmonton, Alberta, Canada.

Home Oil Distributors, Ltd., 555 Burrard, Vancouver, Canada

H. G. Fowler, *Chm. Bd.* E. H. Teagle, *Pres.* H. W. Hamilton, *V. P.* A. Davis, *Sec.* D. Fraser, *Gen. Mgr. Ref.* P. Cook, *Gen. Supt. Ref.* A. Willis, *Ch. Chem.* S. F. Barbour, *Pur. Agt.* Refinery located at North Vancouver, British Columbia, Canada.

Home Oil & Refining Co., Ltd., Humboldt, Saskatchewan, Canada.

H. C. Karels, *Pres.* C. C. Karels, *V. P.* R. Balfour, *Sec.* Al Schaffer, *Gen. Mgr. Ref.* Charles Cott, *Gen. Supt. Ref.* Refinery located at Humboldt, Saskatchewan, Canada.

I

Imperial Oil, Ltd., 56 Church St., Toronto -2-, Ontario, Canada.

G. H. Smith, *Pres.* C. A. Eames, R. V. LeSueur, L. C. McCloskey, John McNeil, A. E. Halverson, *V. P.s* F. E. Holbrook, *Sec.-Treas.* G. L. Stewart, *Gen. Mgr. Ref.* A. D. Grant, Ioco, British Columbia; C. M. Moore, Calgary, Alberta; A. C. Harrop, Regina, Saskatchewan; C. E. Carson, *Gen. Supt.* and J. D. Bradley, *Ref. Supt.*, Sarnia, Ontario; F. C. Mechin, Montreal, Quebec; R. L. Dunsmore, Dartmouth, Nova Scotia, *Ref. Supts.* C. E. Stone, Ioco, British Columbia; J. J. Hanna, Calgary, Alberta; C. R. Moore, Regina, Saskatchewan; J. W. MacDonald, Sarnia, Ontario; L. T. McNaughton and L. C. Lajoie, Montreal, Quebec; R. D. King, Dartmouth, Nova Scotia, *Asst. Supts.* Dr. R. K. Stratford, *Mgr. R.* and *D.* Gordon McIntyre, *Ch. Chem.* T. Montgomery, *Ch. Engr.* L. E. Bury, *Pur. Agt.* Refineries located at Ioco, British Columbia; Calgary, Alberta; Regina, Saskatchewan; Sarnia, Ontario; Montreal, Quebec; Dartmouth, Nova Scotia; Fort Norman, Northwest Territories, Canada.

L

Lion Refining Co., Lion Oils, Ltd., 510 Ninth Ave. East, Calgary, Alberta, Canada.

Dr. L. O. Beauchemin, *Pres.* J. R. Henderson, *Sec.-Treas.* L. L. Plotkins, *Gen. Mgr. Ref.* and *Mgr. R.* and *D.* John P. Collier, *Gen. Supt.* and *Ch. Chem.* Refinery located at Calgary, Alberta, Canada.

Mc

McColl-Frontenac Oil Co., Ltd., Royal Bank Bldg., 360 St. James St. W., Montreal, Quebec, Canada.

J. A. Wales, *Pres.* W. A. Bishop, H. H. Bradburn, J. M. Pritchard, C. P. Tomlinson, *V. P.s* Fred Hunt, *Sec.-Treas.* G. R. Taylor, *Gen. Mgr. Ref.* J. D. Brown, Montreal; R. F. Dimmitt, Toronto, *Ref. Supts.* C. B. W. Anderson, Montreal; K. R. MacGregor, Toronto, *Asst. Supts.* H. B. Barton, Montreal; R. N. Smith, Toronto, *Ch. Chems.* R. C. Kinzer, *Ch. Engr.* B. F. Stanton, *Pur. Agt.* Refineries located at Montreal, Quebec; Toronto, Ontario, Canada.

M

Mid-West Refineries, Ltd., Box 475, Dauphin, Manitoba, Canada.

Herman Deering, *Pres.* Frank Orland Wright, *V. P.* Arthur N. Kerry, *Sec.* and *Treas.* Frank Orland Wright, *Gen. Mgr.* Refinery located at Dauphin, Manitoba, Canada.

N

North Star Oil Co., Winnipeg, Manitoba, Canada.

Col. George Chisholm, *Pres.* T. N. Clayton, W. T. Gwyn, *V. P.s* A. Havelock, *Sec.* W. T. Gwyn, *Treas.* T. N. Clayton, *Gen. Mgr. Ref.* Carl Johnson, *Ref. Supt.* J. Sill, *Ch. Chem.* Refinery located at St. Boniface, Manitoba, Canada.

Northern Petroleum Corp., Ltd., Kamsack, Saskatchewan, Canada.

Stanley Coxon, *Pres.* John Kalmacoff, *V. P.* and *Pur. Agt.* Jacob E. Kalmacoff, Sr., *Sec.-Treas.* and *Gen. Mgr. Ref.* Refinery located at Kamsack, Saskatchewan, Canada.

O

Oughton Bros., Box 81, Calgary, Alberta, Canada.

L. Oughton, *Mgr. Partnership.* Refinery located at Mercury Camp, Turner Valley, Alberta, Canada.

R

Radio Oil Refineries, Ltd., Winnipeg, Manitoba, Canada.

F. M. Sures, *Pres.* B. Hechter, *V. P.* and *Sales Mgr.* M. Hechter, *Sec.* and *Treas.* W. J. Dubesky, *Gen. Supt. Ref.* Refinery located at Winnipeg, Manitoba. Canada.

S

Shell Oil Co. of British Columbia, Ltd., 475 Howe St., Vancouver, British Columbia, Canada.

S. Belither, *Pres.* F. A. C. Guepin, D. Heggie, L. G. McLaren, C. E. Anstie, *V. P.s* A. R. Bradley, *Sec.* D. Heggie, *Treas.* F. S. Clulow, *Gen. Mgr. Ref.* H. H. Hale, *Ref. Supt.* J. C. Storey, *Pur. Agt.* Refinery located at Shellburn, British Columbia, Canada.

Shell Oil Co. of Canada, Ltd., 25 Adelaide St. East, Toronto, Ontario, Canada.

P. M. Fowlie, *Pres.* N. Y. Knox, *V. P.* O. B. Roger, *Sec.* and *Treas.* T. D. Campbell, *Mgr. of Oper,* W. B. Stewart, *Mgr. Ref.* E. W. Thompson, *Asst. Mgr. Ref.* R. D. Boylan, *Proc. Supt.* E. C. Wilkinson, *Ch. Chem.* G. R. Henderson, *Ch. Engr. Ref.* R. G. Blackburn, *Ch. Engr. Mkt.* J. E. Halford, *Pur. Agt.* Refinery located at Montreal East, Quebec, Canada.

Soo Refinery, Ltd., Weyburn, Saskatchewan, Canada.

S. E. Oscarson, *Chm. Bd.* and *Pres.* Albert Wedin, *V. P.* A. J. Onstad, *Sec.* and *Treas.* Stanley Coxen, *Ref. Supt.* and *Pur. Agt.*. Refinery, operated by Northern Petroleum Products, Ltd., is located at Weyburn, Saskatchewan, Canada.

Standard Oil Co. of British Columbia, Ltd., 225 Bush St., San Francisco, Calif.

R. K. Davies, *Pres.* G. E. Kennedy, *Ex. V. P.* H. D. Collier, *V. P.* S. E. Nord, *V. P.* and *Gen. Mgr.* B. W. Letcher, *Sec.* V. F. Palmer, *Treas.* Refinery located at Burnaby, British Columbia, Canada.

HIGHER OCTANE THIRD GRADE GASOLINE

The majority of refiners in the country have decided to use green as the most suitable shade for coloring the new third grade gasoline. As patentees of the anthraquinone greens as fuel colors, the only greens for coloring gasoline that remain green, we are in a position to supply you with the most desirable and useful types and shades of greens and ready to advise you properly on your coloring problem.

All greens and blues suitable for coloring gasoline are anthraquinone and their uses for that purpose are covered by our patent.

Our anthraquinone colors possess excellent solubility and are guaranteed to be stable to light, lead, acid, alkali and storage. Pioneers in the field of dyes for gasoline, we offer the refiners and marketers in addition to the Anthraquinone Greens, Blues and Purples, a complete range of other colors, such as Bronze, Copper, Amber, Gold, etc., soluble in all petroleum distillates.

If you have any coloring problems, due to the blending of various types of gasoline, our many years of experience places us in a position to be able to help and advise you how to overcome your difficulties.

Letter or wire will bring an immediate reply.

PATENT FUELS AND COLOR CORP.
Carew Tower,
Cincinnati, Ohio

PATENT CHEMICALS, INC.
57 Wilkinson Ave.,
Jersey City, N. J.

Refineries Operating in United States

Explanation of Terms Used in Operating Survey

(Comp.)—complete plant, gasoline, kerosene, gas oil, fuel oil, lubricating oils, paraffin, wax, petroleum coke, asphalt or both coke and asphalt, usually includes cracking. Some plants listed as complete do not manufacture asphalt or coke.

(S)—Gasoline, kerosene distillate, gas oil and fuel oil.

(L)—Gasoline, kerosene distillate, gas oil, fuel oil, and lubricating oils.

(A)—Gasoline, kerosene distillate, gas oil, fuel oil and asphalt.

(T)—Tops, distillate, gas oil and fuel oil.

(C)—Same products as skimming, except equipped for cracking.

(W)—Wax.

Where plant includes cracking, lubricating oil and asphalt, (S) is omitted as skimming is implied.

(Crude Cap.)—Maximum number of barrels of crude the plant is able to process daily.

(Gasoline Cap.)—Maximum number of barrels of gasoline the plant is able to make daily, including natural gasoline needed in blend.

ALABAMA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Coastal Petroleum Corp., Mobile	4,000	.....	S	
Total	4,000	.....		

ARKANSAS

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Berry Asphalt Co., Waterloo	1,500	.....	S-L-A	
Cross Co., Henry H., Smackover	6,000	1,500	S-L-C	Donnelly
Lion Oil Ref. Co., El Dorado	16,000	4,000	Comp.	Own
Macmillan Pet. Corp., Norphlet	2,500	.....	S-L-A	
Root Pet. Co., El Dorado	10,000	6,000	Comp.	Own
Stephens Ref. Co., Stephens	750	.....	S	
Total	36,750	11,500		

CALIFORNIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Aromalene, Inc., Signal Hill	1,800	.....	S	
Bush Oil Co., R. R., Long Beach	4,000	.....	S	
California Oil & Ref. Co., Long Beach	2,500	.....	S	
Caminol Co., Ltd., Santa Fe Springs	3,000	.....	S	
Caminol Co., Ltd., Hanford	3,000	.....	S	
Capitol Crude Oil Co. of Los Angeles, Santa Paula	160	.....	S	
Century Oil Co., Signal Hill	5,000	.....	S	
Eagle Oil & Ref. Co., Santa Fe Springs	1,500	.....	S	
East West Ref. Co., Los Angeles	2,000	.....	S	
El Camino Ref. Co., Los Alamitos	3,000	.....	S	
Elm Oil Co., Ltd., Long Beach	1,800	.....	S	
El Tejon Oil & Ref. Corp., Bakersfield	3,500	1,500	S-C	Own
Envoy Pet. Co., Long Beach	3,500	.....	S	
Estado Pet. Corp., Long Beach	10,000	.....	S	
Exeter Ref Co., Long Beach	10,000	.....	S-A	
Fabrico Ref. Co., Inc., Bandini	5,000	.....	S	
Field Gasoline Corp., O. C., Casmalia	2,000	.....	S-A	
Five C. Ref. Co., Santa Maria	2,500	.....	S	
General Pet. Corp. of Calif., Lebec	12,000	.....	S	
General Pet. Corp. of Calif., Torrance	52,000	19,000	S-C	Lummus Kellogg
Gilmore Oil Co., Los Angeles	2,500	.....	S-A	
Gilmore Oil Co., Santa Maria	1,500	.....	S-A	
Golden Bear Oil Co., Oildale	2,000	.....	S-L-A	
Hancock Oil Co. of Calif., Long Beach	12,500	6,000	S-C	Own
Harbor Ref. Co., Inc., Long Beach	2,500	.....	S	
Krieger Oil Co. of Calif., Clearwater	3,500	.....	S	
Lake View Oil & Ref. Co., Maricopa	2,000	.....	S	
Los Nietos Prod. & Ref. Co., Kettleman Hills	500	.....	S	
McCallen Ref. Co., Huntington Beach	3,500	.....	S	
Macmillan Pet. Corp., Long Beach	8,500	.....	S	
Maguire Oil & Ref. Corp., Santa Maria	2,000	.....	S	
Mangold & Tweedy Ref. Co., Long Beach	2,000	.....	S	
Mercury Pet. Corp., Venice	2,500	.....	S-A	
Mohawk Pet. Co., Bakersfield	12,000	1,500	C-A	Own
Norwalk Co., The, Maricopa	5,000	.....	S	
Olympic Ref. Co., Long Beach	6,500	.....	S	
Operators Oil & Ref. Co., Long Beach	2,000	.....	S	
Palomer Ref. Co., Mountain View	1,500	.....	S	
Pacific States Oil & Terminals Co., Wilmington	7,000	3,500	S-C	Own
Pan Pacific Oil Co., Wilmington	1,000	.....	S	
Petrol Corp., Los Angeles	9,500	.....	S-A	
Petrolane, Ltd., Long Beach	2,000	.....	S	
Richfield Oil Corp., Watson	80,000	52,000	Comp.	Sinclair, Black
Rothschild Oil Co., Santa Fe Springs	3,000	.....	S	
San Fernando Ref. Co., Newhall	2,500	.....	S-A	
Seaside Oil Co., Ventura	5,000	.....	S-A	
Shell Oil Co., Martinez	22,700	28,500	S-L-A	Dubbs, Own
Shell Oil Co., Wilmington	36,000	4,000	S-A	Dubbs
Shell Oil Co., Dominguez		41,600	S-C	Dubbs
Shell Oil Co., Coalinga	6,400	.....	S	
Socal Oil & Ref. Co., Huntington Beach	3,000	.....	S	
St. Helens Pet. Co., Ltd., Pico	3,500	.....	S-A	
Standard Oil Co. of Calif., Richmond	100,000	56,000	Comp.	Dubbs
Standard Oil Co. of Calif., El Segundo	100,000	85,000	Comp.	Dubbs
Standard Oil Co. of Calif., Seguro	25,000	.....	S-A	
Super Asphalt Prod. Co., Long Beach	1,500	.....	S-A	
Texas Co., Los Angeles	37,000	10,000	S-C	Holmes-Manley
Texas Co., Fillmore	4,000	3,000	S-C	Cross
Tide Water Associated Oil Co., Avon	48,000	28,000	Comp.	Tube & Tank
Tide Water Associated Oil Co., Watson	9,500	7,500	S-C	Tube & Tank

CALIFORNIA (Continued)

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Triangle Oil & Ref. Co., Venice	3,000	.....	S-T	
Union Oil Co. of Calif., Wilmington	72,000	1,600	Comp.	Cross
Union Oil Co. of Calif., Oleum	20,000	14,000	Comp.	
Union Oil Co. of Calif., Bakersfield	5,000	.....	S	
Wilshire Oil Co., Inc., Norwalk	15,000	12,000	S-C	Dubbs
Total	822,360	374,700		

COLORADO

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Bay Petroleum Corp., Denver	3,000	1,200	S-C	Dubbs
Berthoud Refinery, Berthoud	.....	30	S	
Continental Oil Co., Denver	2,500	1,650	S-C	Cross
McGarr Pet. Corp., Kline	180	.....	S	
Oriental Ref. Co., Denver	1,500	.....	S	Dubbs
Perry Pet. Co., Adams City	1,000	.....	S	
Raven Oil & Ref. Co., Rangely	100	.....	S	
M. & M. Ref. Co., Fort Morgan	50	.....	S	
Texas Co., Craig	2,000	2,000	S-C	Holmes-Manley
Universal Refineries, Inc., Pueblo	1,500	.....	S	
Total	11,830	4,880		

DELAWARE

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Texas Co., Claymont	3,500	.....	S-A	
Total	3,500	.....		

GEORGIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Mexican Pet. Corp. of Georgia, Savannah	4,000	.....	S-A	
Total	4,000	.....		

IDAHO

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Deloraine Ref. Co., Twin Falls	500	.....	S	
Idaho Ref. Co., Pocatello	1,500	1,000	S-C	T.V.P.
Total	2,000	1,000		

ILLINOIS

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Advance Ref. Co., Inc., Centralia	2,000	.....	S	
Allied Oil Corp of Ill., St. Elmo	4,000	2,000	S	
Basin Ref. Co., Centralia	2,000	.....	S	
Calumet Ref. Co., Burnham	1,200	.....	S-L	Schulze High Vacuum
Centralia Ref. Co., Centralia	2,000	.....	S	
Cross Co., Henry H., Colmar	1,000	.....	S	
Cross Co., Henry H., Dupo	1,000	.....	S	
Egyptian Prod. & Ref. Co., Centralia	2,000	.....	S	
Globe Oil & Ref. Co., Lemont	16,500	3,000	S-C	Winkler-Koch
Indian Ref. Co., Lawrenceville	18,000	7,500	Comp.	De Florez
Ohio Oil Co., Robinson	10,000	5,000	S-C-A	Holmes-Manley
Red River Ref. Co., Burnham	1,000	.....	S-L	
Shell Pet. Corp., Wood River	47,000	29,500	Comp.	Dubbs & Cross
Socony-Vacuum Oil Co., Inc. (Lubrite), East St. Louis	7,000	2,200	S-C	Pratt Vapor Phase
Standard Oil Co. (Ind.), Wood River	20,300	6,410	Comp.	Holmes-Manley
Texas Co., Lockport	27,000	19,600	Comp.	Holmes-Manley De Florez Pressure Coke
Worth Ref. Co., Blue Island	3,500	.....	S	
Total	165,500	75,210		

INDIANA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Cities Service Oil Co. (Del.), East Chicago	30,000	18,000	S-C	Own
Shell Pet. Corp., East Chicago	30,000	21,000	S-C	Dubbs
Sinclair Ref. Co., Inc., East Chicago	40,000	30,000	Comp.	Sinclair 600 Combination
Socony-Vacuum Oil Co., Inc. (Wadhams Division), East Chicago	11,800	3,900	S-C	
Standard Oil Co. (Ind.), Whiting	112,100	44,200	Comp.	Holmes-Manley Cross
Troy Ref. Corp.	250	.....	S	
Total	224,150	117,100		

KANSAS

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Barnsdall Ref. Corp., Wichita	5,000	2,500	S-C	Dubbs
Bay Pet. Corp., McPherson	3,000	*1,500	S-C	Dubbs
Chanute Ref. Co., Chanute		1,200	C	Jenkins
Derby Oil Co., Wichita	8,000	3,500	S-C	Dubbs
El Dorado Ref. Co., Eldorado	5,000	2,500	S-C	Winkler-Koch
Falcon Ref. Co., Great Bend	800	.....	S	
Fredonia Oil & Ref. Co., Fredonia	250	.....	S	
Globe Oil & Ref. Co., McPherson	12,000	3,000	S-C	Winkler-Koch
Kanotex Ref. Co., Arkansas City	12,000	4,500	S-C-A	Donnelly
National Ref. Co., Coffeyville	8,000	4,000	Comp.	Own
Petroleum Products Co., Chanute	1,250	800	S-C	Winkler-Koch
Phillips Pet. Co., Kansas City	23,000	7,000	S-C	Dubbs, Own
Roper Petroleum Co., Parsons	550	.....	S	
Shallow Water Ref. Co., Shallow Water	2,000	.....	S-A	
Skelly Oil Co., Eldorado	23,000	15,000	S-C-A	Winkler-Koch
Sinclair Ref. Co., Kansas City	11,000	7,000	S-C	Sinclair 600
Sinclair Ref. Co., Coffeyville	12,000	7,000	Comp.	Sinclair 600
Socony-Vacuum Oil Co., Inc. (White Eagle), Augusta	20,000	16,000	S-C-A	Coil

A message to executives!

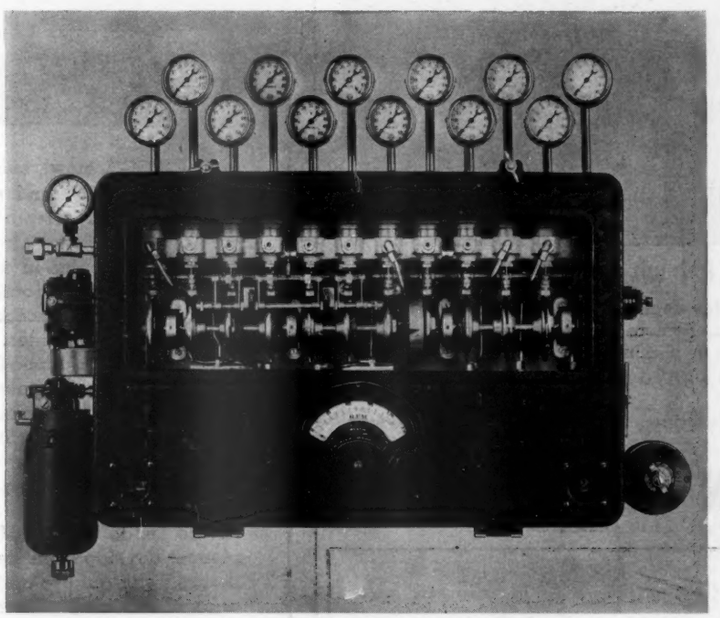
ON THE AUTOMATIC CONTROL OF CATALYTIC PROCESSES

AUTOMATIC control of timing operations in regenerating catalysts, or in discharging them and supplying fresh catalyst, presents no unusually difficult problem to The Bristol Company

BECAUSE:

1. For more than sixteen years Bristol has specialized in designing and building cycle controllers for industrial plant processes.
2. Thousands of Bristol's Cycle Controllers have been built for almost every conceivable type of industrial operation many of which are used on intricate scientific processes.
3. A vast amount of experience has been gained during these many years of building and applying cycle controllers to meet the actual requirements of processes.
4. Bristol's Cycle Controllers are available in a wide variety of flexible forms to take care of almost any number of process operations.
5. Various kinds of safety features to handle almost any situation can be built into these control instruments.
6. Automatic control of timed operations can be interlocked with the control of other process variables such as pressure, flow, temperature, vacuum and liquid level.

If you expect to use cycle control in your new process you should consult our engineering staff, who will gladly give you the benefit of their accumulated knowledge and experience.



THE MODERN TREND IN INDUSTRY

New and revolutionizing developments in the field of industrial-process cycle-control instruments, the equipment today being pioneered by The Bristol Company is far in advance of anything heretofore available. Engineered and built on a solid foundation of experience that stretches back over almost a half century, it is setting new standards for cost and product uniformity.

LEFT: A close-up of a Process-Cycle Controller—one of the thousands that have been built by Bristol.

THE BRISTOL COMPANY
WATERBURY, CONNECTICUT

Branch Offices: Akron, Birmingham, Boston, Chicago, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco, Seattle. Canada: The Bristol Company of Canada, Limited, Toronto, Ontario. England: Bristol's Instrument Company, Limited, London, N.W. 10

BRISTOL'S

TRADE MARK REG. U.S. PAT. OFF.

THOUSANDS OF BRISTOL'S PROCESS CYCLE CONTROLLERS *are now serving some of the country's most progressive and successful manufacturers in the processing of many products in daily use.*

KANSAS (Continued)

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Standard Oil Co. (Ind.), Neodesha	7,500	2,685	S-C	Combination
United Ref. Co., Russell	1,200	700	S-C	Donnelly
Vickers Pet. Co., Potwin	4,000	2,000	S-C	Dubbs
Total	159,550	80,885		

*Being enlarged to 4,000 bbls. per day by April 15.

KENTUCKY

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Aetna Oil Service, Inc., Louisville	3,500	2,000	S-C	
Ashland Oil & Ref. Co., Catlettsburg	4,500	2,400	S-C-A	Dubbs
Louisville Ref. Co., Inc., Louisville	5,000	2,500	S-C-A	Dubbs
South Kentucky Pipe Line Co., Somerset	350	.....	S	
Standard Oil Co. (Ohio), Covington	8,000	4,600	S-C-A	Tube & Tank
Stoll Oil Ref. Co., Louisville	2,000	.....	S-L-W	
Texas Co., Pryse	3,000	2,500	S-C	Holmes-Manley
Total	26,350	14,000		

LOUISIANA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Arkansas Fuel Oil Co., Bossier City	23,000	15,000	Comp.	Tube & Tank

LOUISIANA (Continued)

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Atlas Pipe Line Corp., Shreveport	12,000	6,000	S-C	Own Poly Unit
Bayou State Oil Corp., Hosston	750	.....	S-L-A	Gyro Schulze Vacuum Process
Chalmette Pet. Corp., Chalmette	8,500	.....	S	Kellogg
East Texas Ref. Co., Rodessa	7,000	.....	S	
Lake-Price Refineries, Inc., Princeton	750	.....	S-L-A	
Pan American Pet. Corp., Destrehan	10,000	.....	S-A	
Premier Oil Ref. Co. of Tex., Cotton Valley	3,000	.....	S	
Rodessa Oil & Ref. Corp., Cedar Grove	10,000	6,000	S-C	
Shell Pet. Corp., Norco	21,000	14,000	S-C-A	Dubbs
Southwestern Oil & Ref. Co., Inc., Lake Charles	5,000	.....	S	
Standard Oil Co. of La., Baton Rouge	100,000	52,000	Comp.	Tube & Tank
Stanolind Oil & Gas Co., Superior	4,500	2,000	S-C	Cross
Texas Co., Shreveport	7,000	.....	S-T	
Total	212,500	95,000		

MARYLAND

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Continental Oil Co., Baltimore	7,500	3,500	S-C-A	Cross
Pan American Ref. Corp., Baltimore	8,000	.....	S-A	
Standard Oil Co., of N. J., Baltimore	32,000	48,000	Comp.	Tube & Tank
Total	47,500	51,500		

ELIMINATE VAPOR LOSS and HAZARD WITH THE REGO TANK CAR SYSTEM

Only the vapor and filler adapters stay on the car—the transfer valves always remain at the loading rack.

EVERY CAR IS MODERN with the REGO System—

Investigate this new major development for the oil industry! You'll find that the RegO Tank Car System is simple, positive and inexpensive to install . . . that it eliminates the tremendous loss of gasoline by evaporation . . . and that it prevents the hazards of explosion and asphyxiation.

Send for Folio L-510—it describes the RegO Tank Car System in detail.

The BASTIAN-BLESSING Company
288 E. ONTARIO ST. . . . . CHICAGO, ILL.

MONO-CAST CENTRIFUGAL PIPE

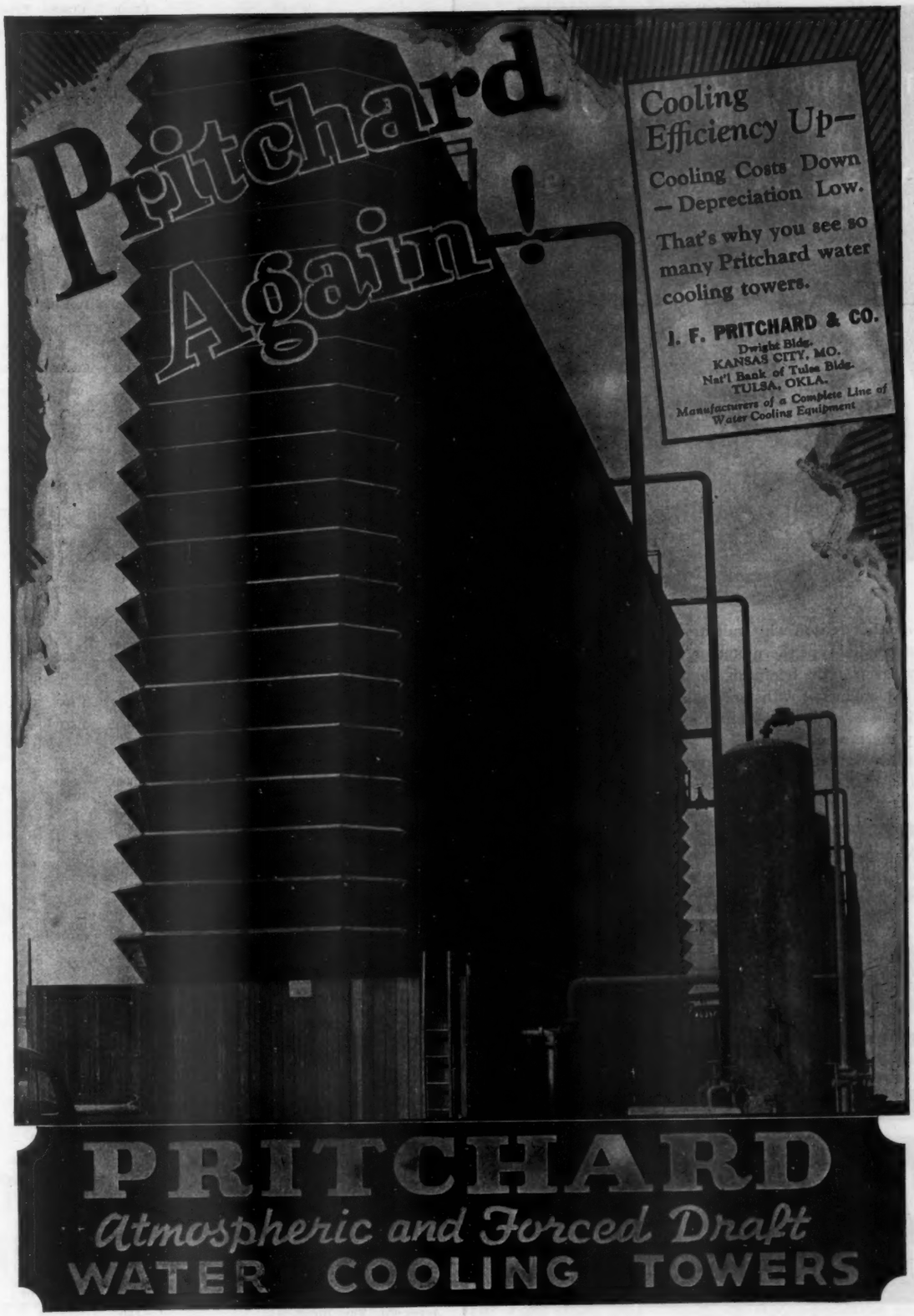
NOW AIR-TESTED AT 100 LBS.

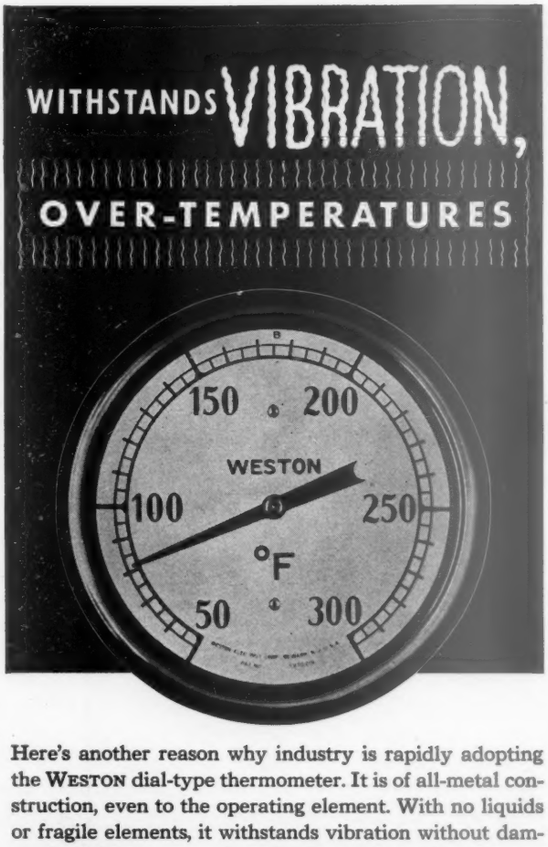
"ACIPCO" now subjects all pipe in sizes 16" and under, intended for oil, gas or gasoline service, to a routine air-test up to 100 lbs. per sq. in., in addition to the long-established routine hydrostatic test. The accompanying photo shows the air-test press by means of which Mono-Cast Centrifugal Pipe are sealed at the ends by rubber gaskets, lowered into a tank of water, then tested with compressed air at any pressure up to 100 lbs. per sq. in. *while completely submerged.* This severe test is another of Acipco's pioneer developments designed to assure peak quality and performance of Acipco products in fields of super service. Write for literature.

AMERICAN CAST IRON PIPE COMPANY
BIRMINGHAM, ALA.
Dallas - Houston - El Paso - Pittsburgh
Kansas City - Chicago - Minneapolis
New York City - Cleveland - Los Angeles
San Francisco

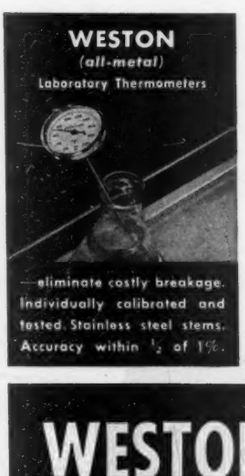
HAVE YOU RENEWED YOUR JOURNAL SUBSCRIPTION?

DO IT PROMPTLY


Pritchard Again!
Cooling Efficiency Up—
Cooling Costs Down — Depreciation Low.
That's why you see so many Pritchard water cooling towers.
J. F. PRITCHARD & CO.
Dwight Bldg.
KANSAS CITY, MO.
Nat'l Bank of Tulsa Bldg.
TULSA, OKLA.
Manufacturers of a Complete Line of Water Cooling Equipment
PRITCHARD
Atmospheric and Forced Draft
WATER COOLING TOWERS



Here's another reason why industry is rapidly adopting the WESTON dial-type thermometer. It is of all-metal construction, even to the operating element. With no liquids or fragile elements, it withstands vibration without damage and *has an over-temperature range* far in excess of ordinary thermometers. You'll find, too, from the following features that it meets your specifications in every particular:


WESTON
(all-metal)
Laboratory Thermometers
—eliminate costly breakage. Individually calibrated and tested. Stainless steel stems. Accuracy within ½ of 1%.

- Easy to read . . . large dial-type scale with bold markings
- Accuracy guaranteed within 1%
- All metal (non-fragile) construction —no glass tubes, no liquids. Stainless Steel (18-8) stems
- Adequately rapid response
- Scale lengths 6", 9" and 12"
- Moisture and fume-proof cases
- Stem lengths 2½ inches to 2 feet. Ranges to 1000°F.

Write for complete literature. Weston Electrical Instrument Corporation, 673 Frelinghuysen Ave., Newark, New Jersey.

WESTON INDUSTRIAL TEMPERATURE GAUGES

MASSACHUSETTS

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Cities Service Oil Co. of Pa., East Braintree	20,000	8,000	Comp.	Cities Service
Colonial Beacon Oil Co., Inc., Everett	30,600	7,720	S-C-A	
Total	50,600	15,720		

MICHIGAN

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Aurora Gasoline Co., Elsie	2,500	.....	S	
Bair Oil Co., F. M., Grand Ledge	300	.....	S	
Bay Ref. Co., Bay City	4,000	.....	S	
Crystal Ref. Co. of Carson City, Inc., Carson City	2,500	.....	S	
Imperial Ref. Co., Grand Rapids	2,000	.....	S	
Inter-Lakes Ref. Co., Flat Rock	1,200	850	S-C	McKee
Keystone Oil Ref. Co., Detroit	1,800	.....	S-L	
Leonard Refineries, Inc., St. Louis	3,000	1,200	S-C	Dubbs
Leonard Refineries, Inc., Alma	3,000	1,200	S-C	Dubbs
Lube Oil Corp., Alma*	1,500	.....	S	
Midwest Refineries, Inc., Alma	3,200	1,200	S-C	Dubbs
Naph-Sol Ref. Co., Muskegon	4,000	1,500	S-C	Dubbs
Old Dutch Ref. Co., Muskegon	2,500	1,400	S-C-A	T.V.P.
Peerless Oil Co., Saginaw	1,000	.....	S	
Producers Ref., Inc., West Branch	1,500	.....	S-A	
Pure Oil Co., Midland	3,000	.....	S-A	
Roosevelt Oil Co., Mount Pleasant	5,000	1,000	Comp.	Combination
Socony-Vacuum Oil Co., Inc., Trenton	14,800	5,700	S-C	
Sovereign Ref. Co., Saginaw	1,000	.....	S	
State Ref. Co., Grand Rapids	1,500	.....	S	
Sweet Oil Ref. Co., Wyman	2,000	.....	S	
Total	61,300	14,050		

*Plant leased to Trumbull Asphalt & Refining Co., Chicago, Ill.

MISSOURI

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Joplin Ref. Co., Joplin	500	.....	S	
Standard Oil Co. (Ind.), Sugar Creek	19,100	*5,950	S-C-A	Holmes-Manley
Total	19,600	5,950		

*Cracked gasoline capacity.

MONTANA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Arro Oil & Ref. Co., Lewistown	2,000	500	S-C	Dubbs
Bears Den Refinery, Chester	50	.....	S	
Big West Oil Co. of Mont., Kevin	1,200	1,000	S-C	Dubbs
Bridger Refinery, Bridger	50	.....	S	
Carroll, L. Ray, Roundup	100	.....	S	
Continental Oil Co., Lewistown	1,225	.....	S	
Cut Bank Ref. Co., Cut Bank	500	400	S-C	
Deloraine Ref. Co., Oilmont	200	.....	S	
Gallatin Valley Co-Operative Co., Belgrade	350	.....	S	
Gallup City Refinery, Gallup City	50	.....	S	
Glacier Production Co., Cut Bank*	1,500	.....	S	
Hannah-Porter Co., Border Field	300	.....	S	
Hart Refineries, Missoula	300	300	S-C	
Havre Ref. Co., Havre	500	.....	S	
Hawley Ref. Co., Conrad	150	.....	S	
Hole Bros. Ref., Cut Bank	400	.....	S	
Home Oil & Ref. Co., Great Falls	1,400	1,100	S-C-A	Dubbs
Hunt, Eugene, Winnett	400	.....	S	
Independent Ref. Co., Laurel	5,000	1,650	S-C-A	Dubbs
Minntana Ref. Co., Lake Basin	80	.....	S	
Morton Refinery, Oilmont	125	.....	S	
North American Ref. Co., Chinook	500	.....	S	
Northwest Ref. Co., Cut Bank	3,000	1,000	S-C	Dubbs
Snow Cap Oil Co., Sunburst	500	300	S-C	Own
Texas Co. (International), Sunburst	5,500	4,000	S-C	De Florez
Treasure State Ref. Co., Shelby	400	.....	S	
Unity Pet. Corp., Kalispell	800	.....	Comp.	
Yale Oil Corp. of S. Dak., Billings	8,000	.....	S-A	
Yale Oil Corp. of S. Dak., Kalispell	1,000	.....	S	
Total	35,580	10,250		

*Under construction.

NEBRASKA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Carpenter, Terry, Scottsbluff	600	.....	S	
Chadron Refinery, Chadron	1,500	.....	S	
Federal Pet. Products Co., Harrison	70	.....	S	
Gordon Ref. Co., Gordon	250	.....	S	
Midland Ref. Co., Crawford	75	.....	S	
Porter Oil Co., Sidney	300	.....	S	
State Line Ref. Co., Mitchell	50	.....	S	
Total	2,845			

NEW JERSEY

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Barber Co., Inc., Barber	10,000	3,000	S-C-A	Cross
Cities Service Oil Co. (Pa.), Warners	12,000	.....	S-A	
Cities Service Oil Co. (Pa.), Petty Island	18,000	8,000	S-C	Cities Service
Seaboard Ref. Co., Pescataway	6,500	.....	S	
Socony-Vacuum Oil Co., Inc., Paulsboro	23,000	4,100	Comp.	
Standard Oil Co. of N. J., New Jersey Works (Bayonne, Linden, Jersey City)*	104,500	105,000	Comp.	Tube & Tank
Tide Water Associated Oil Co., Bayonne	55,000	21,000	Comp.	Tube & Tank
Total	229,000	141,100		

*19,500 bbls. temporarily shut down, not included.

NEW MEXICO

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Aerex Co., The, Bloomfield	100	.....	S	
Basin Ref. Co., Aztec	100	.....	S	
Continental Oil Co., Albuquerque	625	.....	S	
Continental Oil Co., Farmington	750	.....	S	
Continental Oil Co., Artesia	1,500	640	S-C	Cross
McNutt Oil & Ref. Co., Brickland	1,000	500	S-C	Donnelly
Malco Refineries, Inc., Artesia	2,000	1,000	S-C	Dubbs
Pecos Diamond Ref. Co., Inc., Artesia	500	.....	S	
Universal Refineries, Inc., Artesia	1,000	.....	S	
Valley Ref. Co., Roswell	500	500	S-C	Dubbs
Total	8,075	2,640		

NEW YORK

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Allegany Refiners, Inc., Bolivar	1,200	.....	S	
Frontier Fuel Oil Corp., Buffalo	2,500	.....	S-A	
Gulf Oil Corp., Staten Island	14,000	.....	S	
Sinclair Ref. Co., Wellsville	10,000	6,000	Comp.	Sinclair 600
Socony-Vacuum Oil Co., Inc., Brooklyn and Long Island City	19,000	2,275	Comp.	
Socony-Vacuum Oil Co., Inc., Buffalo	8,500	1,400	Comp.	
Socony-Vacuum Oil Co., Inc., Olean	6,500	650	Comp.	
Total	61,700	10,325		

OHIO

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Canfield Oil Co., Cleveland	1,500	.....	S	
Canton Ref. Co., Canton	2,500	1,500	S-C	Dubbs
Gulf Ref. Co., Cincinnati	18,000	8,000	S-C-A	Gulf
Gulf Ref. Co., Toledo	18,000	7,000	S-C	Gulf
Lima Crude Ref. Co., Findlay	700	.....	S	
National Ref. Co., Findlay	3,200	1,300	Comp.	Own
National Ref. Co., Marietta	700	.....	L-W	
Pure Oil Co. (Heath Ref.), Newark	11,000	9,000	S-C-A	Combination
Pure Oil Co., Toledo	15,000	13,000	S-C-A	Combination
Standard Oil Co. (Ohio), Cleveland	21,000	7,800	Comp.	Tube & Tank
Standard Oil Co. (Ohio), Lima	7,500	2,700	S-C	Solar
Standard Oil Co. (Ohio), Toledo	17,000	9,200	Comp.	Combination, Tube & Tank
Sun Oil Co., Toledo	14,000	10,000	S-C-L-A	Own
Total	130,100	69,500		

OKLAHOMA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Anderson-Prichard Ref. Corp., Cyril	7,500	4,000	S-C-A	Winkler-Koch
Barnsdall Ref. Corp., Barnsdall	5,000	2,500	Comp.	Cross
Bell Oil & Gas Co., Ardmore	5,000	2,000	Comp.	Bell
Bell Oil & Gas Co., Grandfield	5,000	2,000	S-C	Dubbs
Black Gold Ref. Co., Oklahoma City	2,500	1,500	S-C	Dubbs
Champlin Ref. Co., Enid	15,000	6,000	Comp.	Winkler-Koch
Cities Service Oil Co. (Del.), Ponca City	12,000	4,500	Comp.	Dubbs-Own
Continental Oil Co., Ponca City	26,000	12,250	Comp.	Dubbs-Cross
Cushing Ref. & Gaso. Co., Cushing	4,500	2,000	S-C	Dubbs
Deep Rock Oil Corp., Cushing	10,000	4,000	Comp.	Dubbs
Johnson Oil Ref. Co., Cleveland	5,000	2,700	S-C	Dubbs
Mid-Continent Pet. Corp., West Tulsa	40,000	.....	S-L-W	Own
Ohio Oil Co., Bristow	5,000	1,500	S-C	Kellogg
Omar Ref. Co., Garber	5,000	2,000	S-C	
Pepper Gasoline Co., Oklahoma City	500	.....	S	
Phillips Pet. Co., Okmulgee	6,000	1,500	S-C-L	Dubbs
Rock Island Ref. Co., Beckett	6,500	4,000	S-C	Winkler-Koch
Sinclair Ref. Co., Inc., Sand Springs	6,000	3,000	Comp.	Cross
Sun Oil Co., Yale	5,000	.....	S	Own
Sunray Oil Co., Allen	7,500	3,500	S-C-A	Dubbs
Texas Co., West Tulsa	16,000	15,600	Comp.	Holmes-Manley Pressure Coke
Tide Water Assoc. Oil Co., Drumright	12,000	7,000	S-C	Tube & Tank
Wilcox, H. F., Oil & Gas Co., Bristow	5,000	2,000	S-C	Dubbs
Total	212,000	83,550		

PENNSYLVANIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Atlantic Ref. Co., Philadelphia	89,000	20,000	Comp.	Lewis, Cross, De Florez Combination
Berry, James B., Sons Co., Inc., Oil City	2,500	*450	Comp.	Dubbs
Bradford Oil Ref. Co., Bradford	2,700	600	S-C-L	T.V.P.
Bradford Penn Ref. Corp., Clarendon	1,000	.....	S-W	
Canfield Oil Co., Corapolis	1,500	.....	S-L	
Cities Service Oil Co. of Pa., Titusville	3,000	.....	S-L-W	
Conewango Ref. Co., Warren	.....	.....	L	
Continental Ref. Co., Oil City	900	*2,400	Comp.	Dubbs
Daugherty Ref. Co., Petrolia	2,000	.....	L	
Freedom Oil Co., Freedom	2,500	700	Comp.	Dubbs
Franklin Creek Ref. Corp., Franklin	2,000	.....	L	
Gulf Oil Co., Philadelphia	30,000	12,000	S-C-L	Gulf
Gulf Oil Co., Pittsburgh	10,000	3,000	S-C-L	Gulf
Kendall Ref. Co., Bradford	4,000	2,200	Comp.	Dubbs
Oil Creek Ref. Co., Titusville	1,800	.....	Comp.	
Penna. Oil Prod. Ref. Co., Eldred	5,000	1,750	Comp.	Own
Pennsylvania Ref. Co., Karns City	1,500	.....	Comp.	
Pennsylvania Ref. Co., Titusville	1,800	.....	Comp.	
Pennzoil Co., Oil City	.....	*7,000	C	Dubbs
Pennzoil Co., Rouseville	10,000	.....	Comp.	
Quaker State Oil Ref. Corp., Farmers Valley	3,500	1,250	Comp.	Dubbs
Quaker State Oil Ref. Corp., Emienton	1,800	1,000	Comp.	Dubbs
Sinclair Ref. Co., Inc., Marcus Hook	40,000	30,000	S-C-A	Sinclair 600
Sherwood Ref. Co., Warren	800	.....	S	
Sun Oil Co., Marcus Hook	70,000	65,000	Comp.	Own
Superior Oil Works, Warren	500	.....	Comp.	
Ultra-Penn Ref. Co., Bruin	1,000	.....	S	
United Ref. Co., Warren	4,000	2,200	Comp.	Dubbs
Valvoline Oil Co., Butler	2,500	.....	S-L-W	
Waverly Oil Works Co., Pittsburgh	1,200	.....	Comp.	
Wolverine-Empire Ref. Co., Reno	2,500	(*)	Comp.	
Total	300,500	149,550		

*Partners in a cracking plant of 4,500 bbls. per day jointly owned by Quaker State, Pennzoil, James B. Berry Sons, and Continental.

RHODE ISLAND

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Socony-Vacuum Oil Co., Inc., Providence	9,000	.....	S-A	
Texas Co., Providence	3,500	.....	S-A	
Total	12,500			

SOUTH DAKOTA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Hot Springs Ref. Co., Hot Springs	120	.....	S	
Rex Oil Refinery, Inc., Rapid City	200	.....	S	
Sturgis Ref. Co., Sturgis	50	.....	S	
Total	370			

SOUTH CAROLINA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Standard Oil Co. of N. J., Charleston	5,000	.....	S-A	

KRUPP

SEAMLESS
HOLLOW-FORGED

REACTION CHAMBERS

and other Pressure Vessels for Cracking and Hydrogenating Oil, Coal, Tar, etc. Designed to work under highest pressures and at highest temperatures; made of open-hearth Carbon or Alloy Steels with particularly high resistance to chemical attack.

For Pipe Lines and Fittings of Hydrogenation and Cracking Plants we recommend our Special Alloy Steels which are immune to Scaling up to 800 deg. Cent. and highly resistant to Hydrogen Attack and the effects of Elevated Temperatures.

1795b

FRIED. KRUPP AKTIENGESELLSCHAFT, ESSEN (GERMANY)

TENNESSEE

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Russell Prod. Co., Sunbright	150	.....	S	

TEXAS

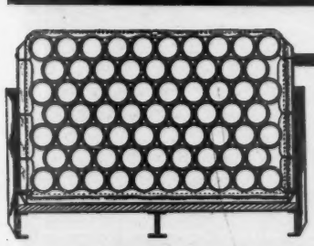
Aero Gas Ref. Co., Fort Stockton	350	.....	S	
American Pet. Co. (of Texas), Houston	10,000	.....	S	
Amsco Ref. Co., Corpus Christi	12,000	.....	S	
Atlantic Ref. Co., Atreco	18,000	6,000	S-C	Combination
Baird Ref. Co., Baird	1,500	1,000	S-C	Own
Bryson Pipe Line & Ref. Co., Bryson	2,000	.....	S	
Bryson Ref Co., Inc., Bryson	600	.....	S	
Barnsdall Ref. Corp., Corpus Christi	5,000	5,000	S-C	Dubbs
Calloway Ref. Co., Grand Falls	300	.....	S	
Coastal Refineries, Inc., Port Isabel	5,000	.....	S	
Coleman Ref. Co., Coleman	600	.....	S	
Col-Tex Ref. Co., Colorado	12,500	3,700	S-C-A	Dubbs
Continental Oil Co., Wichita Falls	4,300	2,350	S-C	Cross
Cosden Pet. Corp., Big Spring	13,500	10,000	S-C	Dubbs
Crown Central Pet. Corp.	15,000	7,500	S-C-L	Holmes-Manley
Danciger Oil & Refineries, Inc., Pampa	6,000	4,000	S-C	Biddison-Boyd
Danube Oil Corp., Borger	800	800	S-C	
Denver Prod. & Ref. Co., Gainesville	2,000	.....	S	
Eastern States Pet. Co., Houston	20,000	12,000	S-C	Gaso. Products
East Texas Ref. Co., Longview	10,000	5,000	S-C	Donnelly
Eggleston Oil Prod. Co., Three Rivers	1,000	.....	S-L-A	
Falls Ref. Co., Wichita Falls	2,500	.....	S	
Farmers Refinery, Lubbock	500	.....	S	
Gratex Ref. Co., Graham	300	.....	S	
Gulf Oil Co., Fort Worth	6,000	3,000	S-C	Gulf
Gulf Oil Co., Port Arthur	115,000	50,000	Comp.	Gulf
Gulf Oil Co., Sweetwater	5,000	2,500	S-C	Gulf
Houston Oil Co., of Tex., Viola	1,000	500	S-C	Dubbs
Howard County Ref. Co., Big Spring	2,000	.....	S	
Humble Oil & Ref. Co., Baytown	137,000	84,000	S-C-L	Tube & Tank Cross
Humble Oil & Ref. Co., Ingleside	22,000	21,000	S-C	Tube & Tank
Humble Oil & Ref. Co., South San Antonio	5,000	.....	S	
Humble Oil & Ref. Co., Neches	5,000	.....	S	
Hurricane Pet. Corp., Arp	3,000	1,800	S-C	Own
Hurricane Pet. Corp., Overton	5,000	3,000	S-C	Own
Jacksboro Ref. Co., Jacksboro	250	.....	S	
Lacy, R., Refinery, Kilgore	2,500	1,800	S-C	Petersen
La Salle Pet. Co., Burkburnett	2,500	.....	S	
McMurrey Pet. Corp., Tyler	10,000	3,000	S-C	Dubbs
Magnolia Pet. Co., Beaumont*	100,000	52,000	Comp.	Cross, Houdry
Magnolia Pet. Co., Corsicana	5,000	.....	S	
Magnolia Pet. Co., Fort Worth	5,800	3,500	S-C	Cross
Magnolia Pet. Co., Luling	6,500	5,500	S-C	Controlled Coil
Majestic Ref. Co., Dale	1,500	.....	S	
Maritime Oil Co., Houston	4,000	.....	S	
Midway Ref. Co., Goldsboro	300	.....	S	
Moutray Oil Co., Hawley	1,250	.....	S	
Muenster Ref. Co., Muenster	300	.....	S	
North Texas Ref. Co., Gainesville	600	.....	S	
Ohio Oil Co., Fort Worth	5,000	1,500	Comp.	Kellogg
Olney Oil & Ref. Co., North Olney	3,000	1,500	S-C	Donnelly
Onyx Ref. Corp., Abilene	2,000	.....	S	
Paluxy Asphalt Co., Talco	5,000	1,500	S-C-A	Own
Pan American Ref. Corp., Texas City	79,000	79,000	S-C	Combination
Panhandle Ref. Co., Kings Mill	2,500	.....	S	
Panhandle Ref. Co., Lueders	1,500	650	S-C	Dubbs
Panhandle Ref. Co., Wichita Falls	4,200	1,500	S-C	Dubbs

TEXAS (Continued)

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Payward Ref. Co., Shamrock	600	.....	S	
Pettus Oil & Ref. Co., Pettus	1,200	.....	S	
Phillips Pet. Co., Borger	35,000	17,000	S-C	Own
Phoenix Ref. Co., Houston	750	.....	S	
Phoenix Ref. Co., San Antonio	1,200	.....	S	
Phoenix Ref. Co., Bruni	1,000	.....	S	
Pioneer Oil & Ref. Co., Somerset	2,000	.....	S-L-A	
Pontiac Ref. Corp., Corpus Christi	7,000	.....	S	
Post Ref. Co., Rotan	800	.....	S	
Premier Oil Ref. Co. of Texas, Willow Springs	4,000	.....	S	Own
Pure Oil Co., Nederland	44,000	31,000	S-C-A	Combination
Rado Ref. Co., McAllen	800	.....	S	
Refugio Refinery, Edinburg	1,000	.....	S	
Refugio Refinery, Refugio	1,200	.....	S	
Republic Oil Ref. Co., Texas City	5,000	5,000	S-C	Winkler-Koch
San Antonio Ref. Co., Southton	100	.....	S	
Shamrock Oil & Gas Corp., Sunray	3,000	3,000	S-C	Dubbs
Shamrock Oil & Gas Corp., LeFors	1,500	.....	S	
Shell Petroleum Corp., Houston	74,000	52,000	S-C	Dubbs
Shelly Refining Co., Bay City	1,000	600	S-C	Own
Sinclair Ref. Co., Inc., Fort Worth	4,000	3,000	S-C	Sinclair 600
Sinclair Ref. Co., Inc., Houston	55,000	44,000	S-C-L	Sinclair 600
Southland Ref. Co., Olney	500	.....	S	
Southport Pet. Co., Texas City	20,000	12,000	S-C	Donnelly
Southport Pet. Co., Kilgore	5,000	3,000	S-C	Own
Southwestern Oil & Ref. Co., Corpus Christi	10,000	.....	S	
Stamford Ref. Co., Stamford	450	.....	S	
Standard Oil Co. of Tex., El Paso	14,000	5,000	S-C	Dubbs
Starlight Ref. Co., Ballinger	1,000	.....	S	
Stone Oil Co., Texas City	7,500	.....	S	
Talco Asphalt & Ref. Co., Mount Pleasant	7,500	.....	S-A	Dubbs
Taylor Ref. Co., Corpus Christi	7,500	.....	S	
Taylor Ref. Co., Taylor	1,000	.....	S	
Terminal Ref. Corp., Corpus Christi	12,000	.....	S	
Texas Co., Port Arthur	125,000	107,500	Comp.	Holmes-Manley De Florez Pressure Coke
Texas Co., Port Neches	33,000	.....	S	
Texas Co., Houston	25,000	2,500	S-C	Tube & Tank
Texas Co., West Dallas	20,000	14,000	S-C	Holmes-Manley De Florez Pressure Coke
Texas Co., San Antonio	5,000	5,000	S-C	Holmes-Manley
Texas Co., El Paso	2,000	2,000	S-C	Holmes-Manley
Texas Co., Amarillo	7,000	4,000	S-C	De Florez Pressure Coke
Texas Oil Products Co., Gladewater	3,000	.....	S	
Texas Pacific Coal & Oil Co., Caddo	600	.....	S	
Tucker Oil Co., Wichita Co., Tex.	250	.....	S	
Valley Ref. Co., Harlingen	1,000	.....	S	
Waggoner Ref. Co., Electra	6,000	3,000	Comp.	Dubbs
Western Ref. Co., Fort Stockton	1,000	.....	S	
White Wing Ref. Co., Inc. (Border Oil Ref. Co.)	1,000	.....	S	
Wickett Ref. Co., Wickett	3,500	.....	S	
Total	1,254,650	688,200		

*15,000-bbl. Houdry unit under construction.

OVER 33,000 Carloads of STEEL PIPE Coated-and-Wrapped by the HILL-HUBBELL Process have been SAFELY DELIVERED



STEEL PIPE being loaded INDOORS at Mills. Diagram shows Patented Unit-Load method which accomplishes the safe delivery of STEEL PIPE.

When one considers that eggs are safely shipped from Maine to California, is it not reasonable that STEEL PIPE Coated-and-Wrapped by the HILL-HUBBELL Process can also be safely shipped? Our record of SAFELY shipping over 33,000 carloads of STEEL PIPE is due to the Patented Unit-Load method that we developed. By the use of this method there is no contact between the STEEL PIPE and car and no friction between the STEEL PIPE. The cross-section at left shows how STEEL PIPE is securely held in place while in transit. We warrant our product to arrive at destination in the same sound condition that it left the mill. Remember—over 33,000 cars of STEEL PIPE Coated-and-Wrapped by the HILL-HUBBELL Process have been SAFELY DELIVERED.

Buy STEEL PIPE Mill Coated and Wrapped at any of these Mills

Jones & Laughlin Steel Corp.
National Tube Company
Republic Steel Corporation
Spang Chalfant, Inc.
The Youngstown Sheet & Tube Company

A request on your letterhead will bring a copy of "Pipe Protection" which describes our process in detail.

Schematic Construction of Specification TAX-1

GENERAL PAINT CORPORATION
HILL, HUBBELL & CO. • Division • Cleveland, Ohio
TULSA • SAN FRANCISCO • LOS ANGELES • OAKLAND • PORTLAND • SEATTLE • SPOKANE
• EXPORT OFFICE SAN FRANCISCO, CALIFORNIA, U. S. A. •

UTAH

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Utah Oil Ref. Co., Salt Lake City	7,500	7,200	Comp.	Modified Holmes-Manley
Spartan Oil Co., Virgin City	100	.....	S	
Wasatch Oil Ref. Co., Woods Cross	1,500	800	S-C	Vapor Phase
Total	9,100	8,000		

VIRGINIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Texas Co., Norfolk	2,000	.....	S-A	

WASHINGTON

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Inland Empire Refineries, Inc., Spokane	3,000	1,250	S-A	W. K.

WYOMING

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Bay Pet. Corp., Cheyenne	1,500	.....	S	
C. & H. Refinery, Lusk	100	.....	S	
Consumers Oil & Ref. Co., Newcastle	1,200	.....	S	
Continental Oil Co., Glenrock	2,800	1,800	S-C	Cross
Diiger, F. G., Newcastle	100	.....	S	
Crook County Refinery, Sundance	50	.....	S	
Dockery & Pelton, Greybull	100	.....	S	
Douglas Ref. Co., Douglas	100	.....	S	
Elk Horn Gas Refinery, Osage	50	.....	S	
Husky Refining Co., Cody	2,500	.....	S-A	
Gillette Ref. Co., Gillette	100	.....	S	
Goshen O. & R. Co., Torrington	250	.....	S	

WYOMING (Continued)

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Gray Refinery, Inc., Newcastle	450	.....	S	
Huber Refinery, Casper	100	.....	S	
Moorcroft Refining Co., Inc., Moorcroft	65	.....	S	
Northwestern Petroleum, Osage	90	.....	S	
Ohio Oil Co., Lovell	2,500	.....	S-A	
Osage Ref. Co., Osage	750	600	S-C	Cross
Oreana Ref. Co., LaBarge	100	.....	S	
Pedro Ref. Co., Pedro	150	.....	S	
Pilot Butte Oil Co., Morton	100	.....	S	
Resolute Oil Corp., Badger Basin	900	.....	S	
Sinclair Ref. Co., Inc., Parco	8,000	7,000	S-C	Sinclair 600
Socony-Vacuum Oil Co., Inc., Casper	6,000	1,000	S-C-A	
Standard Oil Co. (Indiana), Casper	12,600	3,745	Comp.	Vapor Phase
Sheridan Ref. Co., Sheridan	100	.....	S	
Standard Oil Co. (Indiana), Greybull	4,000	970	S-C-A	Cross
Texas Co., Casper	7,000	7,200	S-C	Holmes-Manley Pressure Coke
Texas Co., Cody	3,000	.....	S	
Texas Co. (Calif. Pet.), Calpet	300	.....	S	
Wyoming Oils, Inc., Mills	160	.....	S	
Yale Oil Corp., Lovell	1,500	.....	S-A	
Yale Oil Corp., Worland	500	.....	S	
Total	57.215	22,315		

WEST VIRGINIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Carbide & Carbon Chemicals Corp., South Charleston	2,000	2,000	S-C	Gyro
Elk Ref. Co., Falling Rock	2,500	1,000	Comp.	Dubbs
Pure Oil Co., Cabin Creek	4,000	2,800	Comp.	Combination
Quaker State Oil Ref. Corp., St. Marys	1,800	1,000	Comp.	Dubbs
Total	10.300	6,800		

OILWELL CABLE TOOL UNIT
DRIVES ROTARY DRILLING RIG

WAUKESHA ENGINE
with reversing counter-shaft
TAKES PLACE OF STEAM

In territories where fuel and water are expensive, it is no longer necessary for the drilling contractor who has a steam-driven hoist to discard it. By using a combination of a Waukesha Portable Power Unit driving an *Oilwell* Reverse Counter-shaft Clutch he can drive through a No. 1240 chain to his steam hoist.

Illustration shows an *Oilwell* Cable Tool Drilling Unit applied to a rotary drilling rig—with a Waukesha GAKU Power Unit driving an *Oilwell* reversing counter-shaft, taking the place of a steam engine with reverse.

The Waukesha GAKU is a 6-cylinder 100-150 hp. Portable Power Unit burning natural gas. Thoroughly modern—with renewable hard cylinder liners, built-in governor, seven main bearings, improved manifolding, overhead valves, and hardened heat-resisting exhaust valve seat inserts—it has proved itself in continuous oil field service. *Get Bulletin 902.*

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
NEW YORK · TULSA · LOS ANGELES

PLUS..

You expect straight, smooth, clean-threaded pipe .... but the quality of the steel determines its service

ALLEGHENY LUDLUM PIPE

is 100% controlled from open hearth to finished pipe.. that's why it's been a preferred product in the oil fields for over 30 years

ALLEGHENY LUDLUM STEEL CORPORATION
GENERAL OFFICES: PITTSBURGH, PA.

Houston, Texas Office and Warehouse
504 PETROLEUM BUILDING · PHONE CAPITAL 9096-7

Shutdown Plants in United States

CALIFORNIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Airlane Pet. Co., Oildale	1,500	.....	S-L	
B. & T. Ref. Co., Hynes	1,000	.....	S	
Cameron, J. D., Taft	350	.....	S	
Cole Ref. Co., Seal Beach	2,500	.....	S	
Edington Oil & Ref. Co., Long Beach	5,000	.....	S	
General Pet. Corp. of Calif., Vernon	28,000	.....	S	
Interstate Oil Corp., Taft*	250	.....	S	
Kolingo Ref. Co., Coalinga	500	.....	S-A	
McCallen Ref. Co., Long Beach	3,000	.....	S	
Marquette Ref. Co., Playa Del Rey	1,300	.....	S	
Rice Ranch Oil Co., Orcutt	500	500	S-C-A	Clark
Richfield Oil Corp., Bakersfield	2,000	.....	S	
Richfield Oil Corp., Hynes	55,000	14,000	S-C	Cross
Richfield Oil Corp., Vinvale	10,000	3,600	S-C	Sinclair
Roath Ref. Co., Long Beach	2,500	.....	S	
Steiner, Walter, Ref. Co., Long Beach	1,500	.....	S	
Stockton Oil Co., Inc., Stockton	2,500	750	S-C	
Telegraph Ref. Corp., Compton	1,500	.....	S	
Texas Co. (Calif.), Coalinga	500	.....	S	
Union Oil Co. of Calif., Santa Paula	1,200	.....	S	
Union Oil Co. of Calif., Avila	10,000	.....	S	
Yosemite Oil Ref. Co., Fruitvale	1,500	.....	S	
Total	132,100	18,850		

*In receivership.

COLORADO

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Colorado Oil Ref. Co., Denver	350	.....	S	
Midland Oil Ref. Co., Denver	1,000	.....	S	
Total	1,350			

KANSAS

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Chase Ref. Co., Chase	800	.....	S	
Golden Rule Oil Co., North Wichita	1,000	500	S-C	Jenkins
Workman Oil & Ref. Co., McCune	45	.....	S	
Total	1,845	500		

KENTUCKY

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Central Oil Co., Glasgow	250	.....	S	
Simrall Ref. Corp., Horse Cave	2,600	.....	S	
Total	2,850			

LOUISIANA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Shoreline Oil Co., Shoreline	5,000	2,200	Comp.	

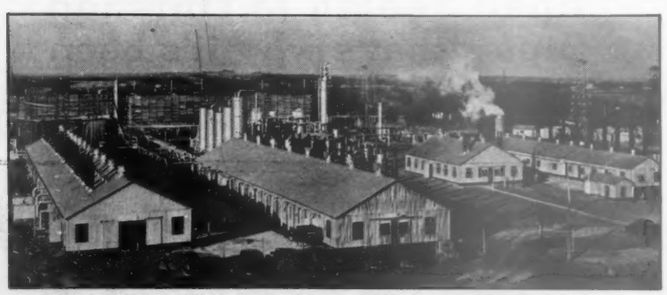
MICHIGAN

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
American Petro-Chemical Co., Wayne	1,200	500	S-C	
Northern Refineries, Inc., Alma	2,500	.....	S	
Pentagon Ref. Co., Plymouth	2,500	.....	S	
Total	6,200	500		

MONTANA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Dunlap Refinery, Cat Creek	75	.....	S	
Hart Refineries, Hedgesville	100	.....	S	
Home Oil & Ref. Co., Conrad	700	.....	S	
Regal Products Co., Soap Creek	50	.....	S	
Russell Oil Co., Billings*	1,500	.....	S	
Russell Oil Co., Butte*	1,000	.....	S	
Total	3,425			

*Operated by Independent Refining Co.



At the time of its erection this natural gasoline plant belonging to J. E. Crosbie, Inc., was the largest in the Fitts field. There are 24 compressors in the unit.

OHIO

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Johnson, A. L., Wayne	60	.....	S	
Montgomery, H. A., Co., Inc., Findlay	500	.....	S-L-A	
Total	560			

OKLAHOMA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Barnsdall Ref. Corp., Okmulgee	7,500	3,000	S-C	Cross
Cities Service Oil Co. (Del.), Okmulgee	4,000	1,000	Comp.	Own
Cosco Oil Co., Wynnewood	2,000	1,200	S-C-A	Dubbs
Cushing Ref. & Gaso. Co., Blackwell	1,700	.....	S	
Eason Oil Co., Enid	4,000	2,000	S-C	Jenkins
Globe Oil & Ref. Co., Blackwell	8,000	4,000	S-C	Winkler-Koch
Illinois Oil Co., Cushing	3,000	1,500	S-C	Donnelly
Knox Refining Co., Covington	300	.....	S	
Monarch Ref. Co., Oklahoma City	1,200	.....	S	
Pilgrim Inc., Kingston	50	.....	S-L	
Pure Oil Co., Muskogee	9,000	5,000	S-A	Combination
Total	40,750	17,700		

PENNSYLVANIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Sloan & Zook Co., Warren	1,500	.....	S	
Warr-Penn Ref. Co., Warren	1,500	.....	L	
Valvoline Oil Co., Warren	1,000	.....	L-W	
Total	4,000			

TEXAS

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Allstate Ref. Co., Thrall	2,500	.....	S	
Alpine Ref. Corp., Houston	3,500	.....	S	
Alto Ref. Co., Clarkwood	250	.....	S	
Beacon Oil & Ref. Co., Henderson	4,500	.....	S	
Benavides Ref. Co., Benavides	1,200	.....	S	
Carson, M. D., Ref. Co., Brady	70	.....	S	
Clay Ref. Co., Arp	3,500	1,000	S-C	Own
Concho Ref. Co., San Angelo	250	.....	S	
Danciger Oil & Refineries, Inc., Lonview	6,000	4,000	S-C	Biddison-Boyd
Dale Oil & Ref. Co., Dale	500	.....	S	
Davis Refinery, Inc., Corpus Christi	1,000	.....	S	
Exchange Pet. Corp., Albany	800	.....	S	
Hightower Oil & Ref. Corp., Brownwood	750	.....	S	
Hill Ref. Co., Ballinger	40	.....	S	
Kent Ref. Co., Angus	4,000	.....	S	
Lamb Ref. Co., Laredo	300	.....	S	
MacMillan Pet. Corp., Borger	7,500	.....	S	
Master Pet. Co., Waco	1,000	.....	S	
Mertzon Ref. Co., Mertzon	200	.....	S	
Minerva Ref. Co., Minerva	1,000	.....	S	
Misko Refineries, Inc., Mirando City	3,500	1,000	Comp.	Donnelly
Phoenix Ref. Co., Pettus	1,000	.....	S	
Plainview Ref. Co., Plainview	800	.....	S	
Rusk Oil & Ref. Co., Overton	4,000	.....	S	
Sinclair Ref. Co., Inc., Gladewater	4,000	.....	S	
Solvex Refineries, Inc., Gladewater	5,000	2,000	S-C	Dubbs
Sunshine Refinery, Livingston	125	.....	S	
Taxman Ref. Co., Wichita Falls	3,000	1,500	S-C	Donnelly
Tower Ref. Co., Overton	3,500	1,000	S	
Tydal Ref. Co., Gainesville	2,000	.....	S	
Wood-Moore Corp., Port Lavaca	1,500	.....	S-L	
Total	67,285	10,500		

UTAH

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Diamond Oil Co., Virgin City*	200	.....	S	
Utah Parks Pet. Co., Virgin	100	.....	S	
Total	300			

*Plant leased to Baker Pet. Corp.

WEST VIRGINIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Tri-State Ref. Co., Kenova	2,500	1,800	S-C	Jenkins

WYOMING

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Beck, G. T., Refinery, Cody	500	.....	S-A	
Eclipse Oil & Ref. Co., Newcastle	100	.....	S	
Lusk Refining Co., Lusk	50	.....	S	
Orchard, Chas., Oregon Basin	50	.....	S	
Tri-State Inc., Thermopolis	1,000	.....	S-A	
Whitman, A. J., Leroy	200	.....	S	
Total	1,900			

Refineries in Canada

ALBERTA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Bell Ref. Co., Ltd., Calgary	750	.....	S	
British American Oil Co., Ltd., Calgary*	4,500	2,500	S-C	Winkler-Koch
British American Oil Co., Ltd., Coutts	2,500	1,200	S-C-A	Dubbs
Fraser, J. W., Ref. Co., Wainwright	100	.....	S	
Gas & Oil Products, Ltd., Harteil	2,000	.....	S	
Gold Standard Oils, Ltd., Wainwright	300	.....	S-A	
Hi-Way Refineries, Ltd., South Edmonton†	600	.....	S	
Imperial Oil, Ltd., Calgary	6,000	4,400	S-C-L-A	Tube & Tank

ALBERTA (Continued)

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Lion Ref. Co., Calgary	500	1,000	S-C	Dubbs*
Oughton Bros., Turner Valley	100	.....	S	
Total	17,350	9,100		

*Under construction. †Shut down.

BRITISH COLUMBIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Imperial Oil, Ltd., Ioco	16,000	3,400	S-C-L-A	Tube & Tank
Shell Oil Co. of British Columbia, Ltd., Shellburn	3,500	.....	S	
Standard Oil Co. of British Columbia, Ltd., Burnsby	2,000	.....	S	
Home Oil Distributors, Ltd., North Vancouver	1,500	.....	S	
Total	23,000	3,400		

MANITOBA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Anglo-Canadian Oils, Ltd., Brandon	1,200	*500	S-C	Dubbs
Mid-West Refineries, Ltd., Dauphin	200	.....	S	
North Star Oil, Ltd., St. Boniface	1,000	.....	S	
Radio Oil Refineries, Ltd., Winnipeg	1,200	.....	S	
Total	3,600	500		

*Under construction.

NOVA SCOTIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Imperial Oil, Ltd., Dartmouth	20,000	12,500	S-C-A	Tube & Tank

ONTARIO

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
British American Oil Co., Ltd., Toronto	6,000	3,000	S-C	Dubbs, Cross
Burlington Refineries, Ltd., Hamilton*	600	.....	S	
Canadian Oil Companies, Ltd., Petrolia	2,500	1,000	S-C	Liquid Phase
Good Rich Ref. Co., Ltd., Port Credit	2,000	800	S-C	Dubbs
Imperial Oil, Ltd., Sarnia	26,000	15,600	Comp.	Tube & Tank
McColl-Frontenac Oil Co., Ltd., Toronto†	5,000	1,000	S-C	Jenkins
Total	42,100	21,400		

*Shut down. †Shut down temporarily.

QUEBEC

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
British American Oil Co., Ltd., Montreal	12,000	6,000	S-C-A	Winkler-Koch
Champlin Oil Products, Ltd., Montreal, E.	2,500	.....	S	
Imperial Oil, Ltd., Montreal	25,000	11,500	S-C-A	Tube & Tank
McColl-Frontenac Oil Co., Ltd.	18,000	6,000	S-C	Jenkins and Gasoline Products
Shell Oil Co. of Canada, Ltd., Montreal, E.	7,000	5,500	S-C	Dubbs
Total	64,500	29,000		

SASKATCHEWAN

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
British American Oil Co., Ltd., Moose Jaw	4,000	2,000	S-C-A	Winkler-Koch
Consumers Co-Operative Refineries, Ltd., East Regina	500	(†)	S	
Eston Ref. Co., Ltd., Eston	300	.....	S	
Hi-Way Refineries, Ltd., Regina‡	175	.....	S	
Hi-Way Refineries, Ltd., Regina‡	600	300	S-C	Tube Still
Hi-Way Refineries, Ltd., Moose Jaw	250	.....	S	
Hi-Way Refineries, Ltd., Rosetown‡	250	.....	S	
Hi-Way Refineries, Ltd., Swift-Current‡	225	.....	S	
Hi-Way Refineries, Ltd., Saskatoon	250	.....	S	
Hi-Way Refineries, Ltd., Prince Albert‡	200	.....	S	
Hi-Way Refineries, Ltd., Weyburn‡	250	.....	S	
Home Oil & Ref. Co., Ltd., Humboldt	400	.....	S	
Imperial Oil, Ltd., Regina	6,500	2,300	S-C-A	Tube & Tank
Northern Pet. Corp., Ltd., Kamsack	200	.....	S	Shell-Still
Soo Refinery, Ltd., Weyburn*	150	.....	S	
Total	14,250	4,600		

*Shut down. Plant will be operated by Northern Petroleum Products, Ltd., during the next three years. †Enlarge to 1,500-bbl. cracking plant in 1939. ‡Shut down.

NORTHWEST TERRITORY

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Imperial Oil, Ltd., Fort Norman	100	.....	S	

Refineries in Mexico

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Tampico, Vera Cruz	55,000	4,200	S-C-A	
Minatitlan, Vera Cruz	33,000	1,200	S-C-A	
Mexico City	12,000	.....	S-A	
Tampico, Vera Cruz	20,000	6,500	Comp.	
Tampico, Tamps	3,000	1,000	S-C	Dubbs
Tampico, Tamps	16,000	.....	S-L-A	
Total	139,000	12,900		

All refineries in Mexico have been taken over by the Mexican Government and are being operated by it.

Valves

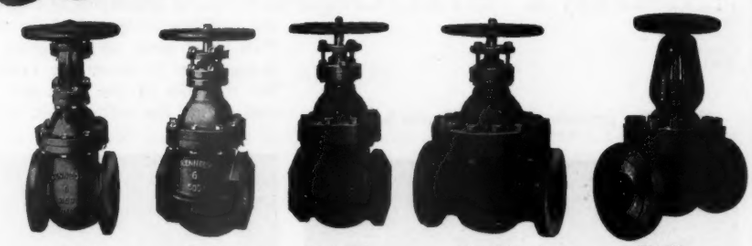


Fig. 170 400-lb. Test | Fig. 177 1000-lb. Test | Fig. 187 700-lb. Test | Fig. 192 1600-lb. Test | Fig. 79 2500-lb. Test

for every pressure in the oil and gas industries

A FULL range of sizes for low, moderate, high and extreme pressure is included in the large Kennedy line of valves for oil and gas industry services. Each type is specially designed for the particular requirements of the service for which it is intended, with a large factor of strength and with many special features of design that assure trouble-free service and long life.

The Kennedy Valve Mfg. Co., Elmira, N. Y.

KENNEDY

VALVES-PIPE FITTINGS-FIRE HYDRANTS

Send for the Kennedy Catalog

WILL HOLD GASOLINE

Typical "Preload" tank

Low Cost "Preload" Gunite or Concrete Tanks Guaranteed to be Crackless and LIQUID TIGHT.

These Tanks are highly resistant to acids and alkalies.

They do not require renewal of bottoms or tops. No painting is necessary. Evaporation losses are reduced to minimum account high insulation value walls and roof. Gunite dome tops permanent and hold gas pressures to three ounces.

The "Preload System" design, Prestressed reinforcement, and our experience in building this type of tank justifies the taking of contracts on a guaranteed non-leakage basis.

If you are interested in the construction of any kind of tank or cover we would appreciate your mailing to us at once the information requested below: or, ask our representative to call.

"Preload" water tank 50 feet diameter, 100 feet high, walls 4 inches at top and 13 inches at bottom. Covered with 2 inch Gunite dome.

NATIONAL GUNITE CONTRACTING COMPANY
1730 Grand Central Terminal Building, New York City.

Please send without obligation on my our part your bulletins:

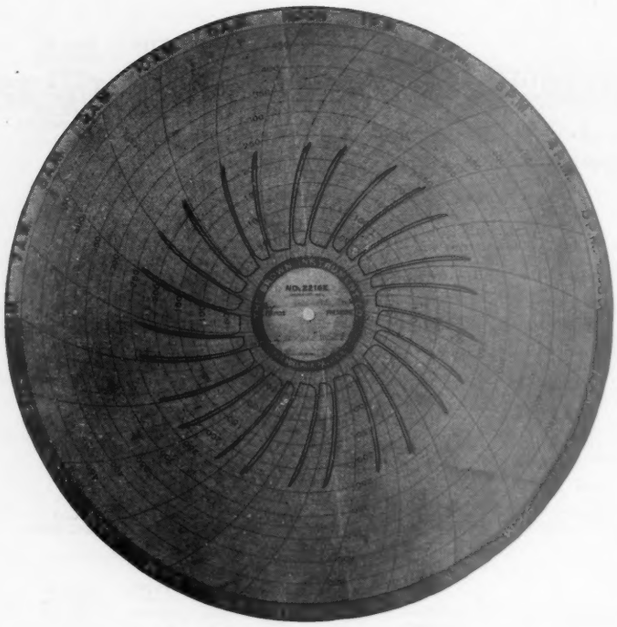
☐ Preload System of Concrete Construction.
☐ Gunite and its uses (Illustrated).

We are considering the construction design of a tank to contain ..... of about ..... bbls. capacity.

.....

ADDRESS .....

.....



Record of pumping operations

Ryan Salt in Bemis

By PAUL REED

For the purpose of disposing of oil field brines produced on properties in the Bemis pool, Kansas, Ryan Consolidated Petroleum Corp. has designed a system which aims to meet the needs of small properties in that area resorting to underground injection.

These disposal facilities serve the F. A. Bemis, "A" and "B" leases in Section 22-11s-7w, Ellis County. Twelve wells on the property have a potential of 24,239 bbls. and an allowable of 9,361 bbls. per month. Together these leases produce 1,877 bbls. of salt water per day which is encroaching at the rate of 8 per cent per month. Wells produce from a depth of 3,400 feet.

A disposal well was drilled to the Cheyenne sandstone, in the Lower Dakota formation, which has a thickness of 143 feet. Total depth of the well is 778 feet. Connate water in the sand is considered to be fresh but it has a brackish taste and is not potable; it contains 5,067 p.p.m. of solids. Since the sand is loose and given to caving, a 44½-foot pocket was drilled below the sand. Pipe used in the well is 60 feet of 10¾-inch, which was cemented to the surface with 16 sacks of cement; 609 feet of 7-inch O.D., which was cemented with 140 sacks of cement and 3 sacks of Aquagel. The sand was topped at 605 feet and bottomed at 738 feet.

The accompanying laboratory report indicates the condition of brine handled in this system. Analysis of two salt water samples, one caught from bleeder at well No. 5, F. A. Bemis lease, Ellis County, Kansas, and one at head of salt water disposal well:

	Well No. 5	Salt water disposal well
Specific gravity, at 70° F.	1.041	1.042
Hydrogen sulfide, p.p.m.	1,530	1,475
Iron and aluminum oxides, p.p.m.	120	120
Suspended matter, per cent	0.03	0.03
Magnesium, p.p.m.	1,026	1,029
CO^2, p.p.m.	14.9	14.9

Adoption of Closed System

An analysis of the water from the Dakota formation, which is nearer the surface than the Cheyenne, shows that it is not potable and that it is unsuited for human or animal consumption.

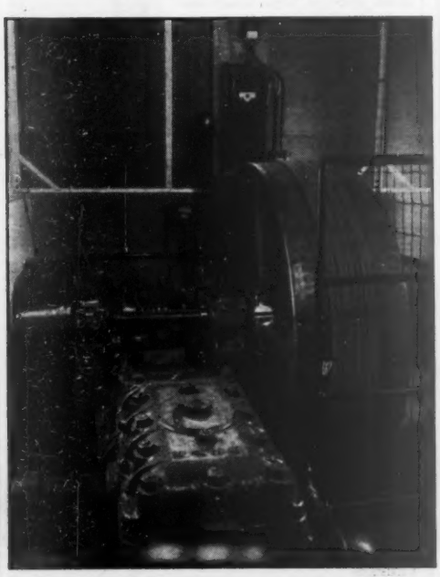
WATER FROM DAKOTA FORMATION

	Parts per million
Silica	38
Iron and alumina	28
Calcium	1/36
Magnesium	52
Carbonate	30
Bicarbonate	616
Sulfates	780
Chlorides	1,828
Sodium	1,559
	5,067

When the problem of disposal was being considered, Vic E. Baum, general production superintendent, sought a solution which would be practicable for properties of this kind. It was decided to inject brine by pump pressure applied in connection with a closed system. From the two tank batteries brine flows by gravity to an 8- by 8-foot (⅜-inch plate) steel tank built to prevent collapse under conditions of vacuum which might exist; this tank is equipped with a spring loaded relief valve. A separator float valve operates a mercoid switch which energizes controls that start the pump. The pump is a Gaso 5- by 10-inch pump driven by a 20-hp. electric motor. Injection is done at 235 pounds pressure at the pump at the rate of 186 bbls. per hour. The prime mover is set to run at a constant speed during the time the salt water is pumped out between the high level and the low level. The tank has gauge glasses to facilitate manual operation when it is drained. Inlets and outlets are 3 feet above the bottom; these are baffled to prevent turbulence. The bottom of the tank has a drain to flush out heavy solids; there is another drain at the high level to drain off floating substances.

Record of Operation

The system operates continuously for 24 hours. A record of operations is furnished by a recording pressure gauge which is changed every day. This chart gives an indication of volumetric efficiency for it shows the number of times that the contents of the tank are pumped into the well. With the information taken from the re-



Injection pump

Instrument board

Surge tank for closed system

Water Disposal Pool

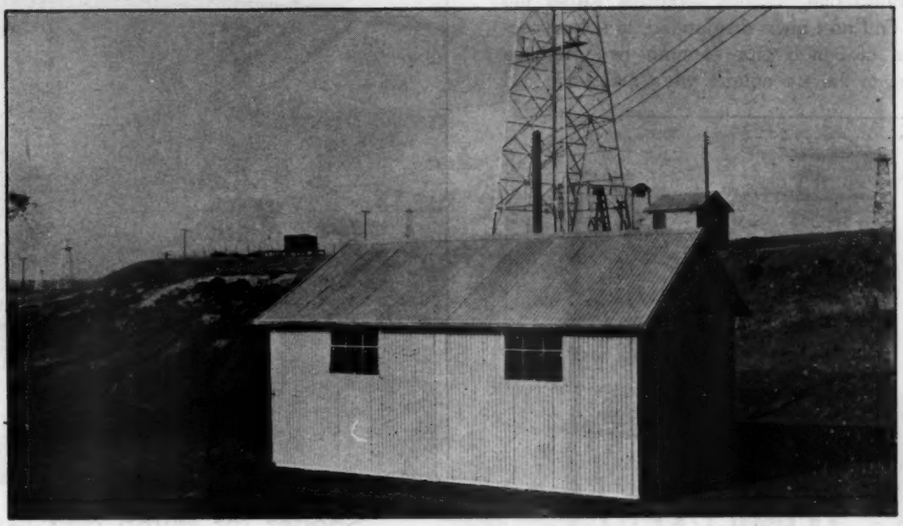
cording pressure gauge, curves have been computed to show the number of barrels per day of salt water injected into the disposal well. A vacuum gauge at the top of the tank provides a convenient means for observing whether there is any change in vacuum conditions which would give indications of the tightness of the system from month to month.

Operation of System

Operation of the system commenced at the end of September 1938. The well takes water at a pressure of 235 pounds. Between each of the pumping periods, pressure drops to about 20 pounds.

Cost of the system is as follows:

Drilling and equipping of disposal well	$2,721.63
Lead lines:	
"A" lease	241.80
"B" lease	579.00
Pumping station	2,521.00
Total	$6,063.43



Pump house for injection well

Since the system was put into operation, a total of 10,500 bbls. per month have been injected, making a total of 55,650 bbls. to the first of March.

This system is being watched with interest by those who are studying the problem of disposing of brines from small properties in this locality.

✦ ✦ ✦

Procedure Eliminates Hazards in Welding Gasoline Tanks

By W. E. ARCHER

Much effort has been spent in attempts to perfect a process or procedure which will eliminate the danger of fire or explosion in performing weld repairs on gasoline, fuel oil and storage tanks, and in preparing these containers for such repairs. Because of the great hazard in this type of work, thorough cleaning customarily preceeds attempts to repair such tanks by welding.

However, Nicholas E. Koch, of 2843 Whittier Boulevard, in Los Angeles, has developed a process for such work which has been approved by several safety engineers, chemists and fire prevention bureaus in California.

He has handled approximately 500 jobs without a single fire or explosion over a period of three years. These jobs covered a variety of tanks ranging from a half gallon in size to 25,000-gallon tanks. Quite a number were truck tanks of from 1,000 to 6,000-gallon capacity; and many were large gasoline storage tanks. The main point in favor of the process is that it is quicker and less expensive.

As briefly explained, by this system or process, the air is forced out of the tank and replaced with inert gas furnished from the exhaust of a gasoline motor. This is heavier than air and strictly non-explosive. Settling to the bottom of the tank, it forces the air out of the top opening of the tank, following which a test is made before actual welding operations are begun. It is also stated that the same degree of safety exists by the use of the process whether the tank is empty or partly filled with gasoline, oil, or vapor. The explanation is that since no air is present in the tank to create combustion, there is no danger whatsoever of fire or explosion, even when a hot fire is burning about the tank.

(Left) *Gasoline tank connected with car exhaust.* (Right) *Check valve and pressure gauge*

Equipment Used

Equipment consisting of motor and compressor provides the inert gas and displaces air. It is stated that one gallon of gasoline will make approximately 3,000 cu. ft. of safety gas at 75° F.

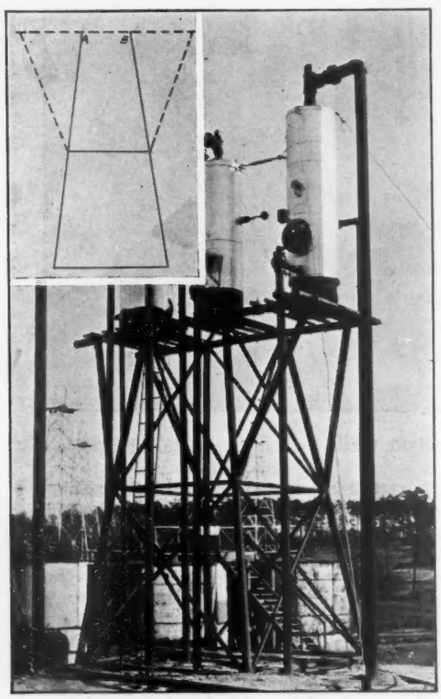
Mr. Koch points out many uses for his process. Tank trucks hauling gasoline can be automatically kept free from air with the process by passing a portion of the exhaust gas from the truck motor through the tanks at all times while full or empty. The same could be applied to fuel tanks of passenger buses, trucks, and private cars. The process also is applicable to storage tanks at refineries; in railroad tankcars when empty, etc.

V. E. Pierret, battalion chief of the Los Angeles Bureau of Fire Prevention, sent the city chemist to attend and observe a demonstration recently, and following the report of the chemist, Mr. Pierret had the following to say: "Upon investigation, together with the chemist's report, we find that using Mr. Koch's process of welding is reasonably safe, provided the process is accurately followed; but the bureau does not want the responsibility of approving the process unconditionally, as we feel that if it is handled by skilled and competent workmen it would be a safe risk, but if in the hands of less skilled and less experienced men there would always be present the element of danger." The procedure is covered by patents.

OPERATING IDEAS

Expanded Separator Tower

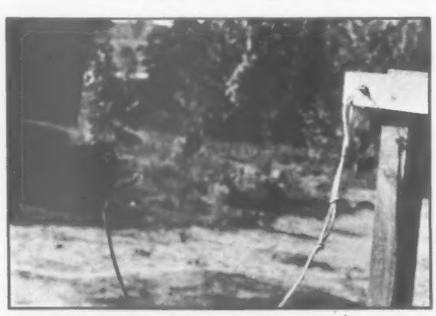
Cost of installing three separators was minimized by slight changes in the welded tower carrying one original separator. After the old unit had been dismantled, the short sections of 3-inch pipe forming two opposite sides of the top square were removed, and



longer pieces of pipe of the same diameter were welded in their places. These new string pieces were long enough to accommodate three platforms, with ample walkway between adjacent units. To support the outer ends of the elongated string pieces, diagonal bracing was carried to the mid-section of the tower uprights, and welded there directly over the point where diagonal and girt braces intersected. To equalize loads, the smallest of the three separators to be used was placed in the middle. The revised structure requires no more floor or foundation space than was originally used; it was reconstructed at a fraction of the cost which would have been incurred in the erection of two towers for this property.

Automatic Shut-Down Device

A pumper near El Dorado, Ark., has provided a method for preventing engine runaway and other over-speeding damage. A wire attached to the engine ignition goes to various points around the unit. One wire goes to a point near the pitman end of the beam, where it is attached by a loop to a short length of sash cord. This loop is long enough to allow for normal pumping motion of the beam end, but it pulls tight if the pitman breaks and the weight of the rod string pulls the beam end past its normal upper reversing point. The cord is also attached to a 3-inch pipe tee, carried on an inclined peg in the beam end; under normal operating speeds this tee rides on the peg, but if the vibration of the beam



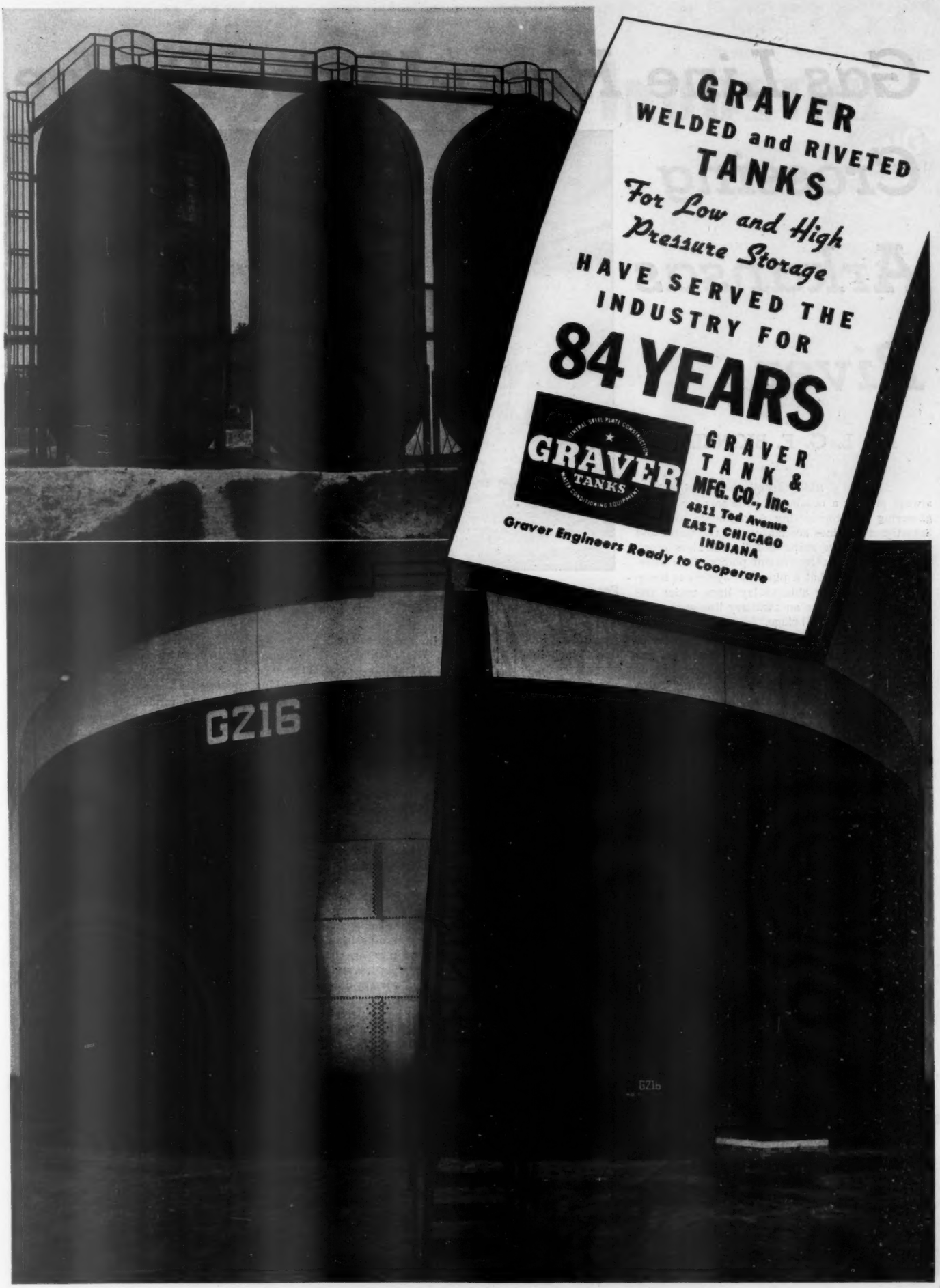
increases to a marked extent, the pipe fitting is thrown clear of its support and falls with force enough to jerk the ignition trip, thus shutting down the engine before a runaway can occur. Another wire is placed below the belt in such a way that the switch is pulled whenever a belt break occurs.

Shelter for Pump and Generator With Drilling Rig

A rotary drilling rig operating on the Texas Gulf Coast has a shelter for feedwater pumps and turbo-generator which is constructed with sides which may be raised. The guard at the right, made of welded 2-inch pipe, has been fabricated to furnish protection in case of an explosion of the turbine when employes and others nearby might be injured.

Beam-Driven Chemical Pump

A pump delivering chemicals to the stream of oil produced from a pumping well in the East Texas field is driven by means of a hook-up made through a rocker arm connected by a rod to the lower web of the crank side of the beam. The rod, made of quarter-inch welding rods, hangs from the bearing, passing through a split block carried on the end of the pump lever. The rod and lever clamps, on this block, are both adjustable, permitting regulation of the stroke and delivery of the "shot" of chemical at any position in the stroke. The feeder is mounted within the samson post; the pump is attached to a cross-member of the steel frame; there are flexible connections from tank to pump, a quarter-inch line goes from the delivery side of the pump to the well-head connection.


GRAVER
WELDED and RIVETED
TANKS
For Low and High Pressure Storage
HAVE SERVED THE INDUSTRY FOR
84 YEARS
GRAVER TANKS
GRAVER TANK & MFG. CO., Inc.
4811 Tod Avenue
EAST CHICAGO
INDIANA
Graver Engineers Ready to Cooperate
G216

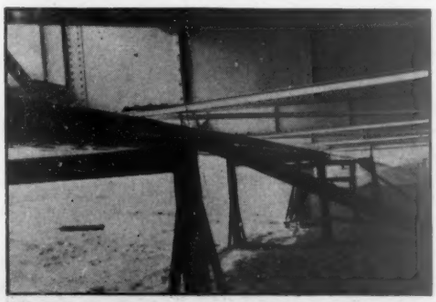
Gas Line Hung Under Bridge Crossing Arkansas River

By L. G. E. BIGNELL

Perspective of under side of Arkansas River bridge near Bixby showing 12-inch gas line in place

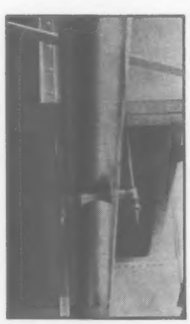
River crossings for pipe lines always present a number of problems for the engineering and contracting departments to solve. Sometimes the lines are laid under the water and at others they are suspended from bridges crossing the streams at convenient points. It is infrequently the case that a pipe line system is fortunate enough to be able to lay lines under the stream and also have an auxiliary line suspended from beneath a new bridge.

The Oklahoma Natural Gas Co. has been fortunate in having the dual condition exist at its gas pipe line crossing north of Bixby where one of the main arteries of the system serving Tulsa and vicinity crosses the Arkansas River. Originally three 8-inch lines were laid across the river but when the new concrete highway bridge was built it was found necessary to cut and abandon one of the 8-inch lines because of the position of a bridge pier and a second line had to be cut and moved to the east to avoid another pier. The two remaining 8-inch lines are in service and in addition the company has recently completed the hanging of a 12¾-inch 33.37-pound welded pipe line under the bridge. This 12-inch line is 1,920 feet long and it ties into the two 8-inch lines on both north and south banks of the stream. This combination will permit the gas company to use both 8-inch lines and the 12-inch line or to use the 12-inch line alone or in connection with one of the 8-inch lines. It makes the system very flexible and precludes the possibilities of interruption of service into Tulsa in the event of high water in the Arkansas River. The pipe line under the bridge is about 7 feet above extreme high-water level and it would be an exceptional flood which would ever raise the water high enough to reach this 12-inch line.



Welding platform and pipe skids under north end of bridge

The "laying" of this 12-inch line was contracted to E. M. Campbell & Co., Tulsa; J. D. Amsey was in actual charge of the work for the contracting firm. The pipe was delivered to the north side of the river and assembled there in three 20-foot lengths by welding. These 60-foot lengths of pipe were next rolled up skids to a working platform built under the bridge. To handle the pipe a tractor with cat-head was used and a manila rope wrapped around the pipe and it was pulled into position. To move the pipe on the platform to bring the ends together for welding the winch upon a heavy-duty truck was used. A set of blocks were suspended under the bridge in such a position as to permit the rope from the winch to be attached by a hook to the north end of the 60-foot joint of pipe and pull it into position. Pipe line-up clamps were then used and the weld completed.

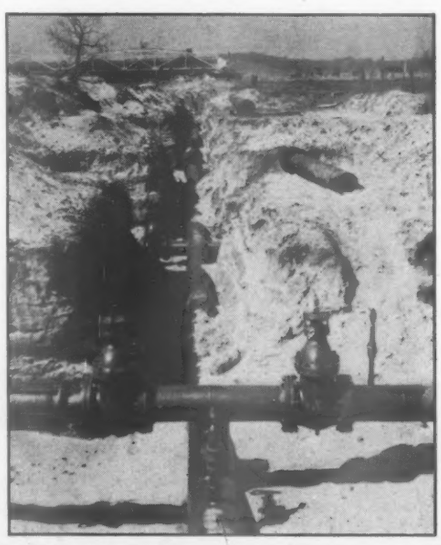


Pipe hanger suspended from floor beams

Bridge Members Prepared for Hangers

The pipe is suspended under the bridge on rollers which hang from bridge floor beams which were punched by the bridge company to accommodate the two three-fourths inch by 25-inch long bolts carrying the roller and the springs on the bolts to permit horizontal adjustment in lining up the pipe. The expansion and contraction of the pipe, estimated at a maximum of 19-inch expansion, is taken care of by permitting the pipe to move over the rollers. At both north and south ends of the bridge the line makes a 90-degree bend to join the 8-inch pipe line headers and this section of pipe between headers and end of pipe permits the pipe to move laterally without buckling or breaking of joints.

As the pipe is in random 20-foot lengths and is welded, it was found necessary to carefully measure the distance between the first hanger on the south end of the bridge and the bend in the pipe which connects with the 8-inch manifold and then measure each joint of pipe as welded into the line. When the total length of the pipe assembled caused the weld to fall at some interval divisible by 20 feet, the spacing of the hangers, another length of pipe was selected and used so that the bead on the weld would not come within



Connection pits on north side of river showing 8- and 12-inch pipe lines and valves

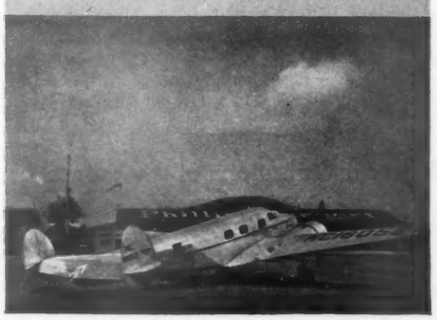
THESE Leaders IN THE INDUSTRY fly ★★ TO SAVE TIME

Phillips 66

Mr. Frank Phillips, Chairman of the Board of Directors, Phillips Petroleum Company, finds air travel indispensable in keeping personal contact with both his Bartlesville, Oklahoma, and New York offices. The Phillips air fleet has proved its value as a means of economical transportation. The saving in time enables company officials to keep widely scattered appointments, and they arrive in better physical condition, less fatigued than if they had spent long hours on a train or in an automobile. Clipping hours from travel schedules also allows the Phillips executives more time for effective work at their destinations.

Since Phillips "took to the air" some twelve years ago, its air fleet has flown well over 2,000,000 miles. The company has owned and operated a total of 23 airplanes. Eight of these have been Lockheeds.

William Parker, active in aviation since 1912, is manager of the Phillips Aviation Department.



. . . and in an industry where wasted time is so essentially a loss of money, dependable air transportation has consistently proved to be a factor of real economy.

Lockheed all-metal, twin-motor airplanes are known throughout the world for their efficient service to private owners, government agencies and 28 major airlines. Year after year the utility and low operating costs of Lockheed airplanes have provided distinct advantages to their owners.

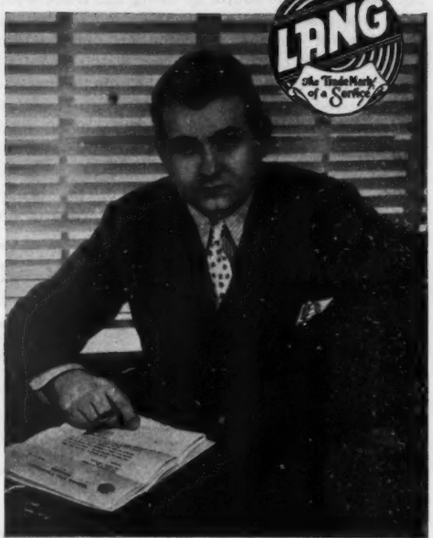
So advanced in design that they are constantly in the front rank of modern aviation, Lockheed airplanes have caused the world to . . .

LOOK TO LOCKHEED FOR LEADERSHIP

LOCKHEED

Representatives Throughout the World

LANG
The Trade Mark of a Service



Mr. Howard M. Lang, Vice President-General Manager of the Lang Transportation Corporation, Los Angeles, uses the Lang Lockheed 12 in the management of the largest tank fleet in the west. Trucking in the states of California, Nevada and Arizona with offices at Los Angeles, Ventura, Visalia, Oakland, Sacramento, and Blythe, California, and Reno, Nevada, presents a picture of scattered operations impossible to supervise personally except by air travel.

In addition to the above enterprises, Mr. Lang operates the Lang Motor Bus system in Long Beach, California, and the Las Vegas Gas Company at Las Vegas, Nevada. As specialists in motor transportation the Lang organization showed its wisdom in selecting a Lockheed 12 to cover its network of operations. Over 50,000 miles have been logged between the various offices since the airplane was purchased.

Roger Rudd is the pilot of the Lang Lockheed 12. It is based at the Grand Central Airport, Glendale, California.

LOCKHEED AIRCRAFT CORPORATION, BURBANK, CALIFORNIA, U. S. A.

24 inches of a roller-hanger. This precaution was taken so that under no circumstances could lateral movement of the pipe cause the bead on the weld to catch on a roller and impede movement.

Pipe Pulled Through

After the 60-foot joint of pipe had been welded to the end of the other pipe the whole was pushed forward, or to the south, by using the truck winch that was also used to butt the ends of the pipe together for welding. A rope was hooked into the north end of the pipe after welding and the truck winch started up and the whole string of pipe moved toward the south, rolling on the hangers. To prevent the pipe from catching on hangers and pushing them out of line the whole set of hangers, which are spaced about 20 feet apart across the 1,900-foot span of the bridge, were wired together. Two wires were attached to the hanger bolts and the ends of the wires fastened to convenient members at north and south ends of the bridge. The end of the pipe was provided with a bull plug and a man went along the bridge supports to guide the pipe into the hangers. The pipe, even when it was all welded together, rolled very easily over the hanger-rollers and the work was performed quickly. It required a little over a week to complete this job including coating the pipe with aluminum paint and making connections to the north and south manifolds of the 8-inch lines.

The line will be tested with 500-pound cold water pressure as soon as the paint job is completed and will then be ready for service. On each side of the river the valves controlling both 8-inch and 12-inch lines will be enclosed in large steel boxes sunk into the sand. This will make them readily accessible. The 8-inch lines are provided with vents for draining the gas out of them if desired and the 12-inch line is provided with connections which can be opened to blow off any condensate that accumulates in the large pipe. The pipe line system is built to operate under a maximum pressure of 250 pounds per square inch. The natural gas delivered to this crossing is gathered in fields southeast, south and southwest of Tulsa and it is one of the important arteries serving Tulsa territory.

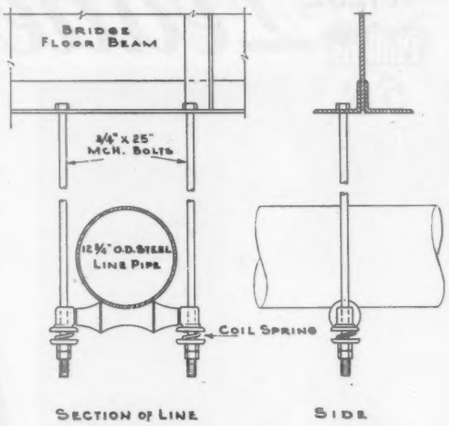


Diagram of method of suspending pipe

Swamp Forces Unusual Separator Installation

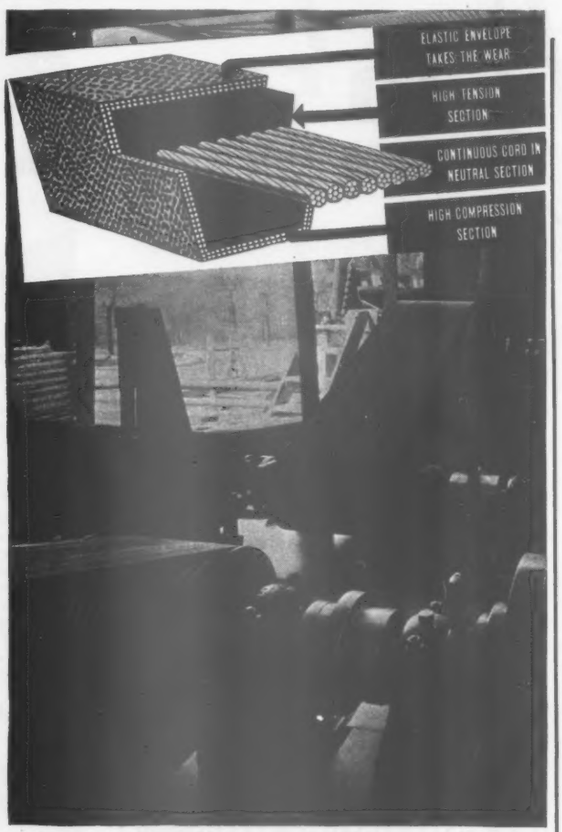
General practice on high-pressure wells is to set oil-gas separators near the wells on which they are used but in the Old Ocean pool near Bay City, Tex., this is impractical as the region is very swampy, due to its being an old lake bed.

J. S. Abercrombie Co., controlling considerable property in this area, has adopted the above type of separator installation to handle production. Separators and tank battery are located on the shore of the old lake above the water level. At times the field is flooded but this makes no difference to the production men.

The principal feature is the battery of 14 separators used. All of the lines from the wells are run into this battery which in turn connects into the tank battery shown above. The tank battery has seven gun-barrel tanks to help in treating the oil. All of the connections up to the separators have a 10,000-pound test capacity. The rock pressure on the field is around 3,000 pounds.

Mineral Valuations of the Future

Many in the oil industry are naturally concerned with the problem of forecasting the future trend of prices for crude oil and estimating the reserves of petroleum. These problems concern many fundamental factors that are influenced by technologic, commercial, political and social factors and are therefore governed by the same general factors which affect all minerals. For these reasons the latest book in the A.I.M.E. series entitled "Mineral Valuations of the Future," by C. K. Leith, professor of geology, University of Wisconsin, should be of much interest and value to many in the oil industry. The book treats of the significance of mineral values, tonnage of quantity estimates, future annual production, the time element—life and deferment cost, selling prices, profit, rate of return in the mining investment, scarcity values and conclusion as to the future of mineral values. All of these phases of this general subject are of interest to the oil industry and oil is mentioned along with other minerals. The book contains 116 pages. It is available to nonmembers of the A.I.M.E. at $1.50 and members $1 a copy and may be obtained from the American Institute of Mining Engineers, 29 West Thirty-ninth Street, New York.



New

MEDART V-BELTS

"They Grip the Grooves"

Transmit the maximum power at a minimum cost—by using the NEW Medart V-Belts which combine every feature of the most modern drive design.

They give you the maximum in V-belt service because of their "balanced groove gripping" action . . . Accuracy of cross section (see above) assures a balanced groove grip...The load carrying section of the belt is co-ordinated with its groove gripping action...Each strand in each individual belt, and each belt in a multiple belt drive carries its proportionate share of the load.

Medart Sheaves — furnished in all sizes.

Write Direct — or get in touch with the nearest Medart Representative or Distributor.

ENGINEERING SERVICE . . . Medart Engineers will co-operate with you in the selection of the V-belt drive that will give you continuous service for the least expenditure.

THE MEDART COMPANY

3524 DeKalb St. • • • St. Louis, Mo.

MEDART

Progress in METALS

By W. L. NELSON

Return Bends and Tube Supports

Although alloy steel return bends have been used for several years the demand has not been standardized until more recently. The latest bulletin of the Ohio Steel Foundry Co. entitled, "Return Bends and Tube Supports," lists the following standard materials:

Service—	Percentage of Carbon	Silicon	Manganese	Nickel	Chromium	Molybdenum
Subzero	.10-.30	.30-.65	.7 -1.00	1.75-2.00	.....	.....
Strength below 900° F.	.20-.35	.30-.65	.55- .85	.....	.....	.....
Strength below 975° F.	.20-.35	.30-.65	.65- .95	.....	.....	.4- .6
Strength below 1,000° F.	.20-.35	.30-.65	.50- .90	1.25-1.75	.35- .85	.3- .5
Strength below 1,100° F.	.15-.30	.35-.75	.45- .75	.....	1.75-2.5	.4- .6
Strength and corrosion, 1,100° F.	.15-.30	.35-.70	.40- .65	.....	4.00-6.0	.4- .6
Strength below 1,025° F.	.20-.35	.30-.65	.55- .85	1.75-2.25	.50- .90	.3- .5
Strength below 1,025° F.	.15-.35	.35-.70	.40- .70	.....	1.00-1.75	.4- .6
Strength and corrosion, 1,200° F.	.10-.25	.35-.70	.40- .70	.....	8.00-10.0	1.0-1.5
Most severe corrosion	.15 max.	2.0 max.	1.00 max.	8.00-10.0	18.00-20.0	.....

The physical properties of these materials are also given.

Another interesting feature is five pages of sketches of special and standard fittings. In all, 152 special bend fittings are shown.

Many of the details of return bends and their fabrication, that are confusing to plant engineers, will be found in this bulletin.

Trend to Molybdenum

The demand for molybdenum as an alloy element is steadily upward. Based on the 1935 production, government data show the following percentage increases:

	Molybdenum concentrates (per cent)	Materials containing molybdenum (per cent)
1935	100	100
1936	146	166
1937	255	276

These figures are not surprising to the oil industry because what might be termed an "invasion" by molybdenum steels has taken place in all branches of the industry.

Metallurgical Terms

Steel, Semisteel, and Cast Iron

The usual definition of steel is—a ferrous material whose properties are due primarily to the carbon contained in it and which can be hardened by quenching. Little hardening can be attained in iron-carbon alloys containing less than 0.08 per cent carbon and hence such alloys are not true steels. The definition appears to be inadequate for differentiating between steel and cast iron because cast iron can also be hardened by quenching. However, at about 1.7 per cent carbon it becomes difficult to prevent the carbon from separating as graphite and hence the materials containing more than 1.7 per cent of carbon and up to about 4 per cent of carbon are classed as cast iron. Larger percentages of carbon than 4 per cent result in useless materials because of the predominating effect of the weak pure carbon contained in them.

Semisteel castings are produced by melting, usually in a cupola, about one-third to one-fifth by weight of wrought iron or soft steel scrap with cast iron. Such materials can be compounded to contain less of the serious impurities such as sulfur and phosphorus, and the carbon content can be kept low.

Centrifugal Cast Steel Gears

The use of centrifugal force during the casting of steel parts is again being extended by the engineers of the Ford Motor Co. In 1935 and 1936, the successful casting of crankshafts and alloy pistons was announced—and now, rear-axle gears and cluster transmission gears of automotive equipment are being cast in commercial practice.

In the past such articles as those enumerated above have been made by forging and in general the forged articles were thought to be superior to castings. This is due to the fact that oxide inclusions and blowholes are found in many castings. However, by the use of centrifugal force, these irregularities are forced to the center of the casting as shown in Figure 1, and are subsequently removed when the center of the casting is machined out of the blank. Note the black line which outlines the final shape of the gear after machining and note the faulty part of the casting lies in the central part that will be cut away during machining. For comparison, Figure 2 shows the macrostructure of the same gear blank but made by forging. Examination of Figure 2 shows definite striation lines running somewhat parallel to the line along which force will be applied to the gear tooth. These crystal formations in the metal are lines of weakness and hence it is clear that the forged gear will not be as strong as the cast gear. The greater strength of the cast gears has been substantiated by service tests and experience.

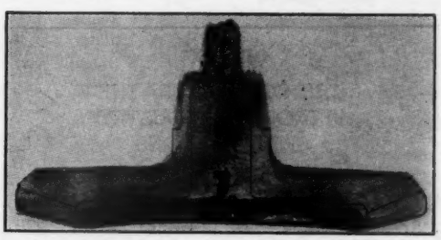


Fig. 1—Macrostructure of one of the rear-axle gear blanks as centrifugally cast. Superimposed dark lines show outline of the finished rear-axle gear. Protrusion at the top is the excess metal of the casting

One of Mr. Ford's cardinal principles is that if a process for making a part will save 25 per cent or more of metal without sacrifice of strength or utility, the new process is worthy of development. By centrifugally casting gears rather than producing them by forging, it is possible to save 25 per cent of metal and in addition, the cast gears are stronger than forged gears and the process of manufacture by casting is cheaper than forging. Furthermore, the special steel molds used in centrifugally casting are cheaper than forging dies. The two figures and much of the material in this article was taken from the article by Edwin F. Cone, entitled "Ford Centrifugally Cast Steel Gears," Page 279 of Metals and Alloys of October, 1938.

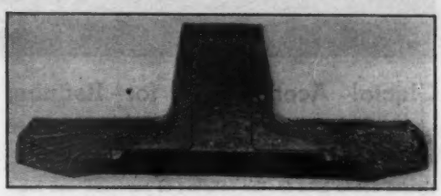


Fig. 2—Macrostructure of one of the rear-axle gear blanks as forged. Superimposed dark lines show dimensions of finished rear-axle gear

A Quick Shop Test for Quality of Weld and Its Correlation With the Standard Tests

(Paper presented at the fall 1938 convention of the American Welding Society by W. J. Conley)

More can be deduced about the quality of a metal by an expert examining a simple fracture, it is often said, than by a staff of scientists using a battery of laboratory apparatus. It is in this spirit that W. J. Conley proposes to determine the quality of an arc or gas weld by nicking it with a hack saw, breaking it under a hammer, and examining the fracture. The expert examiner looks for the character of fracture, whether ductile or brittle, as well as for defects, such as slag and blowholes.

To prove his contention, Conley has subjected arc and oxyacetylene welds in structural and corrosion resisting steels three-eighths inch thick to the standard tests involving relatively expensive specimens. At the same time, he has applied his quick shop test to the specimens. As was expected, the ranking suggested by the quick test and worked out by statistical methods was practically the same as that dictated by the results of standard tests for strength, toughness and ductility. The conclusions drawn were that the quick nick test does not require long experience for interpretation, and that the strength and ductility of a weld are manifested visibly in the fracture.

Anticorrosives From Petroleum Fractions

Corrosion preventive compounds for almost every type of metal or alloy, or type of corrosion, are being manufactured from oxidized petroleum fractions by the Alox Corp., Niagara Falls, N. Y. Many compounds have been produced, among which the organic acids, ketones, esters, lactones, alcohols, etc., each of which is inferred to be useful for special types of corrosive action.

Applications which would seem to be of particular interest to the petroleum industry are for covering pipe lines (No. 712), vehicle for aluminum or other corrosion during fabrication, shipment or storage of of fine metallic products such as balls and seats, pump parts, machine and engine parts, and sucker-rods.

In general, the compounds may be used to delay corrosion during fabrication, shipment or storage of metal parts, as a primer coat prior to application of paints, etc., and for all somewhat protected machinery.

QUESTIONS ON TECHNOLOGY

By Charles K. Francis, Ph. D., Technical Editor

Glacial Acetic Acid for Refining Kerosene and Lube Oils

If you have any information covering the use of glacial acetic acid for the refining of kerosene and lubricating oils, will you please give me a description of the process?—W. K. B.

Glacial acetic acid has recently been explained by Bhatnagar and Ward as adapted as a selective solvent for improving the quality of kerosene and lubricating oil stocks. It is a particularly effective medium for removing unsaturated naphthenic and aromatic hydrocarbons, including resins and resin-forming compounds.

This acid is applied for the treatment of kerosene in six operations, each being continuous countercurrent, except No. 5, as shown in the following outline: 1. Extraction of the kerosene with glacial acetic acid. 2. Washing of the raffinate from No. 1 with recovered wash water from an azeotropic distilling system. 3. Precipitation of oil from the extract of No. 1, using the combined aqueous solutions from the raffinate, precipitated oil, and fuel oil washings. 4. Washing of precipitated oil with recovered wash water from the distilling system. 5. Continuous azeotropic distillation of the aqueous acid-fuel oil solution obtained from the precipitation stage, to recover acid and substantially acid-free wash water and to obtain a residue containing some acetic acid. 6. Washing of the residual fuel-oil acid solution from the azeotropic distillation with recovered wash water.

Operating on a heavy kerosene fraction it was found that 125 per cent treatment by volume of glacial acetic acid effected an increase in smoke point from 14.5 to 24.5 mm. Mid-Continent distillate lubricants treated with 175 to 200 per cent acetic acid at 140° F., gave yields of about 80 per cent. Some of the results obtained when treating a 400-viscosity oil are shown in the table.

ACETIC ACID EXTRACTED OIL

VISCOSITY 400

Visc. S.U. sec.:	Untreated	Treated
210° F.	53.8	52.1
100° F.	405.0	347.0
Viscosity index	63.4	79.0
Sp. gr. at 60° F.	0.911	0.901
Conradson carbon, per cent	0.259	0.142

Additional details, including flow sheets may be found in the reference.

References: S. S. Bhatnagar and P. J. Ward, Ind. Eng. Chem., 31, 195, 1939. See S. T. Schicktanz, "A Laboratory Extraction Apparatus and Its Use in Separating a Lubricating-Oil Fraction With Acetic Acid." Jour. Research National Bureau of Standards, 20, 83, 1938. Rose and White, "Separation, by Distillation With Acetic Acid, of the Aromatic Hydrocarbons From the Fraction of a Mid-Continent Petroleum Boiling Between 154° and 162° C." Jour. of Research of the National Bureau of Standards, 21, 16, 1938.

Agricultural Operations Costs With Animals and Tractors

An item has been called to our attention in which the statement is made that tractors are used in farming operations at less than half the cost of the same operations with horses or mules. Can you give us further details about this?—C. T. A.

A comprehensive article by Gilbert, Meijnen and Sambrook includes the expense for agricultural operations for a man and two horses as compared with the same work done by tractors on land cultivated in Great Britain. The reported costs have been converted to the approximate United States money values.

FARM OPERATIONS COSTS PER ACRE

	Horse-drawn implement	Tractor-drawn implement
Ploughing	$3.12 to $5.00	$1.12 to $1.87
Cultivation*	.62 to 1.00	.56 to .68
Rolling	.37 to .50	.18 to .25
Harrowing	.37 to .50	.18 to .25
Drilling	.75 to 1.25	.29 to .37
Harvesting†	7.50 to 10.00	3.75 to 5.00
Total	$12.73 to $18.25	$6.08 to $8.42

*Horses could not pull the deep cultivators that are used with tractors

†The comparison is made between building, stacking, ricking and threshing and combine and drier.

Note.—The figures for tractor-drawn implements include an estimated average allowance for depreciation and repairs of tractor and implement of 50 cents per hour.

These authors state that the estimated consumption of petroleum fuels in agriculture has increased from 125,410,000 Imperial gallons in 1932 to 174,800,000 gallons in 1937, an increase of some 40 per cent.

The Works Progress Administration reports the annual domestic sales of farm tractors increased from 2,000 in 1909 to about 185,000 in 1936, with an estimated total in use in 1936 of 1,250,000, or approximately one tractor to every fifth farm. The tractor accounts for fully one-half of the reduction in work animals in the United States and the consequent reduction in labor required in breeding, care and growing feed for them. The total saving of labor on farms because of tractor influence is nearly 600 million man-hours. The tractor has made by far the most important contribution to mechanization in agriculture in recent years.

References: C. L. Gilbert, D. H. Meijnen and K. H. Sambrook (Asiatic Petroleum Co.), Petroleum Fuels in Relation to Agriculture in Great Britain, Petroleum Times, Oct. 8, 1938, page 455.

E. G. McKibben and R. A. Griffin, The Farm Tractor, in W.P.A. National Research Project on Reemployment Opportunities and Recent Changes in Industrial Techniques, Summary of Findings to Date, March 1938.

INDEX

CHEMICALS FOR THE PETROLEUM INDUSTRY SPECIFICATIONS

A

Chemical	Issue Date
Acetic Acid	November 3 1938
Acetone	May 27 1937
Acetylene	April 1 1937
Acidless Tallow Oil	April 29 1937
Activated Charcoal	January 20 1938
Alpha Naphthol	July 29 1937
Aluminum Chloride Anhyd.	November 11 1937
Aluminum Stearate	December 8 1938
Aluminum Sulfate	January 13 1938
Ammonia Alum	October 20 1938
Ammonia Aqua	July 14 1938
Ammonium Chloride	November 17 1938
Aniline	May 13 1937
Anhydrous Ammonia	August 19 1937

Properties of Cutting Oils and the Different Types

What are the essential properties of cutting oils? Could you explain the reasons for the different types?—V. H. G.

The properties of cutting oils must necessarily be related to the physical conditions under which they are used, such as rate of feed or speed, tools for cutting, composition of material machined, finish required and accuracy. The manufacture and use of cutting oils is extensively treated in the several articles presented before the Institute of Petroleum. These are listed in references below.

The first purpose of a cutting oil is reduction of frictional heat in metal cutting. Water was the first medium used, but rusting was found to be a disadvantage and a certain degree of lubrication was desired. Soft soap solutions were an improvement over water, although water is the best coolant known.

Cutting pastes possess excellent adherence to the metal being machined. A formula is shown.

CUTTING PASTE

	Parts
Lubricating oil	150
Oleine	85
Caustic soda	6
Water	250

and sufficient 20 per cent caustic soda solution to give an oil of bright appearance.

The success with pastes suggested the use of aqueous emulsions from soluble oil. A moderately useful oil is prepared by mixing 1 part of rosin oil with 10 parts of lubricating oil and adding 20 per cent caustic soda solution until a clear oil results which emulsifies with water.

The true sulphonated type of emulsifiable oil is the most frequently used today, and this is because it is so adaptable to different machining operations. Here is a typical formula:

SULPHONATED TYPE EMULSIFIABLE OIL

	Parts
Sulphonated soya bean oil	13.5
Sulphonated castor oil	25
Lubricating oil	17
Water	32

The straight oils, mineral and fixed, are now frequently modified. An example is the sulfurized oil shown in the formula:

SULFURIZED OIL

	Parts
Lard	50
Mineral oil	50
Wool grease	10
Sulfur	8

A heavy-bodied concentrate is produced, and is regarded as a base oil which is normally thinned back with further mineral oil before use.

Neat or straight cutting oils should be used where lubrication is the primary requirement and soluble oils when the cooling factor is of first importance.

Generalizations covering essential properties are not advisable. A soluble oil should emulsify quickly, a cutting oil must not be corrosive under conditions of use. Its essential properties include high specific heat, fluidity, good lubricating value; it must be noninjurious, noninflammable, and stable

References: Journal of the Institution of Petroleum Technologists, Vol. 24, 1938.

J. F. Miller, Manufacture of Cutting Oils, p. 645.

A. H. Lloyd and H. H. Beeny, Cutting Fluids and the Machine Tool, p. 650.

H. J. Mason, Selection of Cutting Fluids, p. 655.

H. W. Swift, Functions of Cutting Fluids, p. 662.

FIELD OPERATIONS

Summarizing the Week's Developments

OKLAHOMA—The twenty-second oil well in the Ramsey pool, Payne County, was completed for a potential of 14,808 bbls. per day, making it the third largest well in the field. Two other Ramsey tests were due for completion this week. A pool was opened in Section 4-1n-5w, Stephens County, and a small wildcat producer was completed in Section 17-6-6, west of the Konawa pool in Seminole County.

KANSAS—A wildcat 3 miles south of Ellinwood, Barton County, cored saturation in Arbuckle lime and was due to open a pool in Section 24-20-12w. The Ellinwood pool was extended one-half mile southeastward in Section 15-20-11w. The Morel pool, Graham County, was extended 1¼ miles to the southeast. The Buhler pool, Reno County, was extended one-half mile westward; the Gorham pool, Russell County, one-half mile to the southeast, and the Hittle pool, Cowley County, one-fourth mile southeastward.

TEXAS—The largest producer ever drilled in Shackelford County was completed last week, good for 2,600 bbls. per day. A south outpost to the Griffin field in Jones County started at 2,688 bbls. per day. Northwest of the Cowden pool in Ector County a 546-bbl. well opened considerable acreage for development. Two Yoakum County wildcats that may link the Denver and Bennett pools were not yet completed but were showing encouragingly. The Sid Richardson well, a north extension to the Slaughter pool in Hockley County, rated 2,048 bbls. per day on its official test. A wildcat in Scurry County, in Section 129, Block 97, H.&T.C. Survey, was swabbing oil. Lone Star Gas Co.'s recent pool opener in Stephens County flowed over 500 bbls. following an acid treatment. New wildcat locations featured the North Texas report for the week. In the big East Texas pool only one well was completed. Henderson County's prospective new pool opener was still being tested. It flowed 25 bbls. in 70 minutes in one test in the past week. The Flag Lake pool in Henderson County was extended 1,000 feet south. A pool was opened in Jim Wells County, the first well producing 100 bbls. a day of 60-gravity distillate. A wildcat 4½ miles south of Algoa, Brazoria County, now being tested, held most of the interest in the Gulf Coast. The Tepetate pool in Acadia Parish on the Louisiana side of the coastal district was extended north.

NEW MEXICO—One of the larger producers in recent months in Eddy County was completed in Section 1-18-29, Maljamar district. It flowed 250 bbls. of oil in three hours. A well in the South Eunice field, Lea County, flowed 1,045 bbls. of oil through tubing in 20 hours. Five producers and a failure were completed in the Vacuum field, Lea County.

ILLINOIS—Dry weather and a hot sun have combined to improve road conditions in the basin fields and field work is expected to soon show the results of the improvement. The new pool in Washington County is the topic of most discussion. Several new wells have been started near the cemetery well in Section 15-3s-3w, which proved the structure to be of importance.

Completions in All Fields

(Week Ending March 25, 1939)

	Oil	Gas	Dry	Total	1939 total comp. to date	1938 total comp. to date
N. Y., Pa., and W. Va.	40	6	3	49	756	1,179
Ohio	3	6	4	13	204	212
Indiana	0	0	0	0	29	25
Kentucky	4	0	4	8	125	176
Illinois	36	1	12	49	772	158
Michigan	14	0	5	19	248	173
Kansas	10	3	4	17	248	450
Oklahoma	19	1	10	30	399	403
Texas:						
North Central Texas	20	1	26	47	497	638
West Texas	33	0	2	35	434	553
Texas Panhandle	7	3	0	10	88	179
East Texas	1	0	0	1	165	589
East Central Texas	1	0	4	5	54	90
East Texas Border	1	0	0	1	20	37
Gulf Coast Texas	22	1	4	27	298	298
Southwest Texas	33	1	12	46	519	484
Total Texas	118	6	48	172	2,075	2,868
North Louisiana	4	1	4	9	110	143
Gulf Coast Louisiana	4	1	2	7	138	120
Total Louisiana	8	2	6	16	248	263
Arkansas	1	0	3	4	61	47
Montana	1	0	1	2	25	12
Wyoming	2	0	2	4	26	41
Colorado	0	0	0	0	3	1
New Mexico	13	0	2	15	143	141
Utah	0	0	0	0	0	0
California	13	0	4	17	210	328
Total United States	282	25	108	415	5,444	6,477
Total previous week	290	40	78	408		
Week ending Mar. 26, 1938	375	28	98	501		

Outstanding Fields—Highlights

(Week Ending March 25, 1939)

FIELD—	Rigs up	Wells drlg.	Weekly oil completions	Initial prod.	Total No. oil wells	Daily av. prod.
TEXAS						
K.M.A.	21	41	4	2,755	947	21,900
Wasson-Bennett	9	37	4	2,755	233	10,198
Ector County	8	56	6	5,978	1,621	45,195
Winkler County	1	13	4	1,097	1,775	36,786
Howard-Glasscock	4	26	1	1,522	1,050	15,952
East Texas	3	12	1	45	26,016	372,850
OKLAHOMA						
St. Louis	4	24	3	1,264	794	29,450
Sac and Fox	3	11	4	700	102	3,200
KANSAS						
Barton County	4	19	1	110	411	12,630
Stafford County	3	9	0	0	253	6,580
Rice County	6	21	4	926	1,286	32,530
Russell County	4	19	1	12	1,206	24,200
NEW MEXICO						
Lea County	12	63	11	3,172	2,053	94,460
LA-ARK-TEX						
Shreveport, La.	2	12	1	650	16	2,850
Cotton Valley, La. (deep)	2	7	1	3,870	120	12,975
Jennings, La.	2	4	1	495	143	24,513
MICHIGAN						
Freeman-Redding	4	25	2	2,300	67	12,348
Van Buren County	6	25	7	2,850	169	15,280
ILLINOIS						
Central Illinois	38	316	36	6,386	2,680	156,090
CALIFORNIA						
Wilmington	6	19	2	575	601	84,250
KENTUCKY						
Birk City	3	13	2	100	122	1,276

Illinois and Kentucky

By STAFF CORRESPONDENT

Cordes Pool in Washington County Is Given Quick Play

CENTRALIA, Ill., Mar. 27.—Under the influence of this fine dry spring weather road conditions are improving and it is possible to haul material to locations in some parts of the big area that could not be reached a short time ago. The Wabash River is still high and some wells in the counties west of that stream are still under water, but it is believed the worst has been passed and that the basin fields will soon again hum with industry.

Only 49 completions were reported in the past week, 36 of which were oil wells with a total initial production of 6,386 bbls. Twelve dry holes, six of which were in Fayette County, and one gas well in Lawrence County, were recorded.

In Fayette County, three dry holes were abandoned in Section 34-8n-3e, two were abandoned in Section 31-7n-3e, and one in Section 24-6n-2e. Kingwood Oil Co. in an effort to open a Devonian lime field in Marion County was also a failure. Two tests in Clay County were dry and abandoned and one in Jasper County, and two in Effingham County failed to open pools and were given up as hopeless.

Illinois Fields

HIGHLIGHTS OF THE WEEK: Wells have been started northeast and southeast of the Cochrane-Blankenship "cemetery well" in Washington County, and the new pool is the most interesting spot in Illinois at this writing. Weather conditions have improved and the whole basin area is expected soon to resume its busy appearance as of last fall.

Daily production of new pools, 156,090 bbls.; old pools, 7,673 bbls.; total, 163,763 bbls.

Completed oil wells, 36; operations including locations, rigs and wells drilling, 368.

Eleven oil wells with an initial production of 2,088 bbls. comprised the Louden, Fayette County, field's record of the week, while in the Salem field in Marion County, 21 wells registered a total initial of 4,060 bbls., a number of the wells having been produced only three hours. Three small wells in Clinton County, good for 107 bbls. and one in Jefferson County good for 131 bbls. completed the record.

The extension of the Cordes pool in Washington County last week resulted in several new locations. The extension well, Blankenship and Cochrane No. 1 Oak Grove Cemetery (a 2½-acre plat), in the SE SE SW Section 15-3s-3w, is now carried under the ownership of the Mainton Petroleum Co. The exact location is 160 feet from the south and 169 feet from the east lines of the southwest quarter. The company was rigging up No. 2 Cemetery, 330 feet from the south and 60 feet from the east lines of the southwest quarter, and was drilling No. 1 Kerwicke, 8 feet from the north line and 141 feet from the east line of the NW NE quarter of Section 22. W. C. McBride, Inc., has started drilling in the C NW SW SE Section 15-3s-3w, and made a location in C NE SW SE Section 15, both on the Wiese farm. No. 1 Cemetery was credited with having swabbed 245 bbls. in 24 hours. It is not yet a completion.

Max Pray's test north of Centralia which failed to find production in the Niagara lime will be deepened. It is No. 1 Langenfeld, a mile north of the Sandoval pool in SW SW NW Section 4-2n-1e.

Completed Wells

Following is the completion record of the week, the initial oil production representing 24 hours unless otherwise stated:

In Fayette County, Louden area, Liggett & Davis No. 1, School lot, NW cor. Section 34-8n-3e, abandoned at 1,200 feet. Pete Hoffman No. 2 Bank, NW SW NE Section 34-8n-3e, stray sand at 1,608-16 feet, total depth 1,650 feet, abandoned. Pete Hoffman No. 1 Bank, SW cor. NE Section 34-8n-3e, salt water in top of Stray sand at 1,615 feet, total depth, abandoned. Carter Oil Co. No. 5 L. Cummings, NE cor. SW NW Section 32-8n-3e, Bethel sand at 1,568-77 feet, shot with 30 quarts, flowed 510 bbls. through tubing, and 90,000 cu. ft. of gas. E. Frank Jones No. 2 Clara McCann, NE NW SE Section 31-8n-3e, Weiler sand at 1,518-52 feet, pumped 17 bbls. in 12 hours. Carter Oil Co. No. 1 Rhodes B, NW NE SE Section 27-8n-3e, stray sand at 1,541-65 feet, shot with 40 quarts, swabbed 236 bbls. through casing and 40,000 cu. ft. of gas. Carter No. 1 Logue, NW NW NE Section 34-8n-3e, shot with 30 quarts at 1,525-34 feet, swabbed 118 bbls. of oil and some gas through casing. Evan & Bonner No. 1 Boyd, SW cor. SE SW NW Section 31-7n-3e, dry Weiler sand at 1,618-70 feet, water at 1,672-1,715 feet, total depth, abandoned. J. M. Huegley, Jr., No. 1 Buff, NW cor. SE SW NW Section 31-7n-3e, water in Weiler sand at 1,605-09 feet, total depth, abandoned. Stewart Oil Co. No. 1 McPheeters, NW NW SW Section 28-7n-3e, Weiler at 1,580-97 feet, shot with 20 quarts, pumped 50 bbls. of oil and 125 bbls. of water. Carter Oil Co. No. 2 L. Deal, SW NE NW Section 6-7n-3e, Weiler at 1,497-1,533 feet, total depth 1,588 feet, plugged back to 1,533 feet and shot with 60 quarts, swabbed 240 bbls. through casing. H. Rosenthal No. 1 Kepner, SW cor. SE SW NW Section 31-7n-3e, Weiler at 1,574-94 feet, pumped 128 bbls. Carter No. 3 Mary Kistler, SE SW NW Section 6-7n-3e, Weiler at 1,504-45 feet, shot with 40 quarts, swabbed 104 bbls. through casing. Carter No. 3 M. McClean, SW NW NW Section 4-7n-3e, Bethel sand at 1,577-84 feet, shot with 10 quarts, swabbed 288 bbls. through casing. Carter No. 2 E. Shelton, SE NW NW Section 9-7n-3e, stray sand at 1,562-78 feet, shot with 20 quarts, swabbed 197 bbls. through casing. Dixie Oil Co. No. 4-B Arnold, NE cor. NW Section 19-7n-3e, Weiler at 1,519-40 feet, pumped about 200 bbls. L. & G. Oil Co. No. 1 Stewart, SE SW SE Section 24-6n-2e, Benoist at 1,795 feet, total depth 1,827 feet, small showing of oil, abandoned.

Salem Field

In Marion County, Salem field, Texas Co. No. 6 S. Parker, SW SE NE Section 33-2n-2e, Benoist sand at 1,860-94 feet, flowed 30 bbls. in three hours, rated at 210 bbls. per day. Texas No. 4 E. Hays, SE SW SE Section 33-2n-2e, Benoist at 1,863-1,907 feet, flowed 45 bbls. in three hours, rated at 315 bbls. per day. Texas No. 2 McConnaughey A, SW SE SE Section 32-2n-2e, Benoist at 1,776-1,827 feet, pumped 41 bbls. in three hours, rated at 287 bbls. a day. Texas No. 4 J. McConnaughey, SE SE SE Section 32-2n-2e, Benoist at

Better Weather Conditions Are Helpful to Western Kentucky

OWENSBORO, Ky., Mar. 27.—Flood waters of the Ohio and Green Rivers have been receding for several days, and as they fall the oil business picks up. Locations are being made and idle wells are again active. The Major Oil Co. No. 1 West, in the Birk City field, which had to be temporarily abandoned because of the high water, was cemented last week and plug will be drilled early this week. It is in McClosky lime and there was a good showing of oil in the hole. Production in the Birk City field, which had fallen over 50 per cent because of the flood, is expected to see a decided upturn soon. Oil companies with leases in the field are now able to pump their wells.

The important discovery of oil in the McClosky lime in McLean County where J. C. Ellis No. 1 Stevens Heirs opened a pool two weeks ago, continued to be the most interesting news from the western Kentucky fields. The well, which is 1 mile southwest of Livermore on the south side of the Green River, began flowing last Wednesday and trucks were being used to haul the production away. The production was choked down to about 10 bbls. per hour, flowing naturally. It is expected the well will soon be given a pipe line connection. Total depth of the discovery is 1,640 feet.

The Hunsaker, Hobbs and Campbell test on the W. J. Cox estate 7 miles southeast of Madisonville, in Hopkins County, was reported to have about 750 feet of oil in the hole, but the report says it will be deepened to 2,240 feet before it is tested in the McClosky lime, which was topped at 1,763 feet. This is the first McClosky lime showing reported from Hopkins County. The Gulf Refining Co. deep test on the Schmetzer farm, 7 miles west of Madisonville, was abandoned at 4,548 feet.

The Fordsville Gathering Lines, Inc., of Owensboro, has made application with the U. S. War Department for permission to maintain a floating dock on the Kentucky side of the Ohio River at a point 2,300 feet upstream from Dam 48. This dock would be used as a loading place for oil piped to the river from the Corydon pool.

The Kentucky Public Service Commission approved an application of the Ashland Oil & Refining Co. to purchase the crude oil gathering system of the Illinois Pipe Line Co., serving approximately 2,000 wells in the Owensboro district. Deeds, on which federal stamps had been placed indicating a purchase price of $110,000, were filed in the office of County Clerk Henry M. Griffin, completing the transaction. The name of the new owner listed in the deeds is the Owensboro-Ashland Co.

Following operation report shows completions and first reports of wells started:

Daviess County, Cane Run School district: Cane Run Petroleum Co. No. 4 I, M. Alsip drilling at 300 feet.

(Continued on Page 194)

1,773-1,824 feet, flowed 67 bbls. in three hours, estimated good for 467 bbls. per day. Texas No. 9 McCollum, SE NW NE Section 32-2n-2e, Benoist at 1,686-1,720 feet, flowed 51 bbls. in three hours, rated at 357 bbls. a day. Texas No. 7 Friesner, NW SE NW Section 32-2n-2e, Benoist at 1,673-1,715 feet, flowed 132 bbls. in three hours, estimated good for 924 bbls. a day. T. D. Lain No. 5 Dempsey, NW NE SW Section 31-2n-2e, Benoist at 1,742-84 feet, flowed 336 bbls. Potter Brothers No. 1 M.&I.R.R., NW cor. NE NW NW Section 21-2n-2e, Benoist at 1,790-1,840 feet, flowed 455 bbls. Magnolia Petroleum Co. No. 18 W. O. Chitwood, SE NW SE Section 21-2n-2e, Bethel sand at 1,860 feet, shot with 40 quarts at 1,870-81 feet, flowed 330 bbls. Kingwood Oil Co. and Bell No. 1 E. Rogers, N half SW NE SE Section 21-2n-2e, Fredonia at 2,051 feet, showings at 2,090 to 2,146 feet at intervals, pumped 15 bbls. in six hours. Texas No. 3 M. Johnson, SW NE NE Section 16-2n-2e, Benoist at 1,860-83 feet, pumped 34 bbls. in three hours, rated at 238 bbls. per day. Magnolia Petroleum Co. No. 25 W. O. Chitwood, SE cor. NW NW SE Section 16-2n-2e, Benoist top at 1,845 feet, shot with 40 quarts at 1,855-75 feet, flowed 276 bbls. R. E. Johnson No. 1 Cole, SW cor. SE NW SE Section 16-2n-2e, Bethel at 1,844-77 feet, shot with 20 quarts, pumped 300 bbls.

In the south end of the Salem field, Texas Co. No. 7 Hawthorne, SW cor. NE Section 8-1n-2e, McClosky at 2,026-43 feet, flowed 141 bbls. in three hours, rated at 987 bbls. a day. Rockhill Oil Co. No. 13 Foster, NW SW SW Section 8-1n-2e, Aux Vases sand at 1,878 feet, shot with 30 quarts at 1,892-1,912 feet, pumped 150 bbls. Mammoth Producing & Refining Co. No. 3 Seibel, SE SE SE Section 8-1n-2e, top of Fredonia at 2,055 feet, total depth 2,106 feet, pumped 55 bbls. in 17 hours. Frontier Oil & Gas Co. No. 2, School tract, NW NW SE Section 8-1n-2e, McClosky at 2,009 feet, total depth 2,058 feet, flowed 975 bbls. per day through casing. Texas No. 11 Small, NE NE NE Section 5-1n-2e, Benoist at 1,769-1,810 feet, flowed 45 bbls. in three hours, estimated at 315 bbls. per day. Texas No. 4 L. Hawthorne, SW cor. NW SW SE Section 5-1n-2e, Aux Vases topped at 1,809 feet, total depth 1,869 feet, pumped 16 bbls. in three hours. Texas No. 4 Hawkins, SW NE SW Section 5-1n-2e, Benoist at 1,724-67 feet, flowed 38 bbls. in three hours, rated at 266 bbls. a day. Hollingsworth No. 10 Kalkbrenner, NE NE SW Section 5-1n-2e, McClosky lime at 1,948 feet, total depth 2,002 feet, flowed 528 bbls. Kingwood Oil Co. No. 1 Burg, NE SE NE Section 18-1n-2e, dry and abandoned at 3,692 feet. Devonian lime was topped at 3,512 feet, there was a gas showing at 3,620-37 feet. A drill stem test at 3,615-40 feet, open 40 minutes, recovered 90 feet of mud with an odor of gas and sulfur.

In Clinton County, Illo Oil Co. No. 1 Roberts, SW cor. SE NE NE Section 24-1n-1w, Bethel sand at 1,375-82 feet, shot with 5 quarts, pumped 14 bbls. Claude Bell No. 1 Althoff, NW SE NE Section 8-1n-3w, Cypress sand at 1,015-36 feet, shot with 15 quarts, pumped 10 bbls. of oil and 4 bbls. of water. Shell Petroleum Corp. No. 8-A Criley, NE SE SE Section 35-2n-1w, Centralia field, Weller sand at 1,211-20 feet, pumped 83 bbls.

In Effingham County, Kingwood Oil Co. No. 1 Casey, NW NW NW Section 27-6n-4e, St. Louis lime at 2,458 feet, total depth 2,467 feet, dry and abandoned. Whisenant and others No. 1 Betram, SW NW NW Section 23-8n-6e, Fredonia lime topped at 2,460 feet, total depth 2,511 feet, dry and abandoned.

In Jasper County, Roby Drilling Co. No. 1 Whalen, SW SW SW Section 24-8n-9e, dry and abandoned at 2,732 feet. Roseclair lime was topped at 2,666 feet.

In Clay County, Burnett and others No. 1 Smith, NE NW SE Section 21-5n-5e, total depth 2,540 feet, plugged back to 2,405 feet to test Aux Vases sand, lost the hole and abandoned the well. Kingwood Oil Co. and Continental Oil Co. No. 1 Vandyke, SE SE SW Section 11-5n-6e, St. Louis lime at 2,922 feet, total depth 3,078 feet, dry and abandoned.

In Lawrence County, R. E. Lonergan No. 1 Fisher & Tewalt A, NW cor. SE SE NE Section 12-4n-11w of second principal meridian, Bridgeport sand at 824-32 feet, 1,500,000-cu. ft. gas well.

In Jefferson County, Carter Oil Co. No. 1 Luchsinger, SW SW NW Section 3-1s-2e, Bethel at 1,973-81 feet, shot with 7 quarts, pumped 131 bbls. of oil and 20 bbls. of water.

Progress of Interesting Tests

Following shows the progress of interesting outposts in the state since the last report. The list includes wildcat drilling wells, offsets to undrilled acreage, which come under the head of semiwildcats, and new wildcats first reported in the past week. Numerous wells not listed are shut down on account of high water.

In Menard County, Arthur Scroggin No. 1 Johnson Brothers, C SW SW Section 24-19n-5w, drilling at 1,730 feet.

In Champaign County, Sidney Oil & Gas Co. No. 1 Wendling, SW cor. NE NE SE Section 10-17n-10e, drilling at 1,450 feet, in lime.

In Macon County, Snake Hill Development Co. No. 1 Dipper, NE SE NW Section 17-16n-2e, total depth 2,125 feet.

In Shelby County, Rex Development Co. No. 1 Odell, NE SE NW Section 20-14n-2e, shut down at 550 feet. Independent Refining & Producing Co. No. 1 Hackenburg, SE SW SW Section 20-12n-2e, total depth 1,652 feet, pulling 6-inch casing to run shoe. Corn and others No. 1 Wabash R.R., C N half N half Section 27-10n-5e, shot with 10 quarts at 1,544-51 feet, casing parted 100 feet off bottom.

In Clark County, Phillips and Kost No. 1 Shuey, NW SE SE Section 31-12n-14w of second principal meridian, drilling at 410 feet. Miller and Miller No. 1 Young, NE cor. NW NE Section 17-11n-14w of second principal meridian, drilling at 461 feet. Harry Dunn and others No. 1 Henry Medsker, C NE NE Section 7-9n-12w of second principal meridian, drilling at 250 feet.

In Coles County, Texas Canadian No. 1 MacMillan, C SE SW Section 3-12n-8e, rigging up rotary. Wheless and others No. 2 Michaels, SE SE NE Section 2-11n-7e, Ste. Genevieve lime topped at 2,050 feet, Osage lime at 2,455 feet, drilling at 2,875 feet.

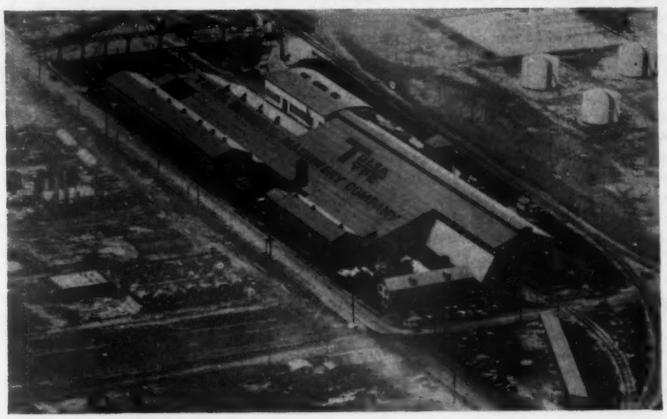
In Montgomery County, Cassen and others No. 1 Wilkering, NW SW NE Section 34-10n-2w, drilling at 350 feet. Fred DeMier No. 1 Canady, SW cor. SE SW Section 31-9n-4w, drilling at 332 feet.

In Macoupin County, W. G. Dillon and others No. 1 Keele, SE SE NE Section 32-10n-9w, Trenton lime top at 1,454 feet, drilling at 1,520 feet.

In Edgar County, Black & Moore No. 1 Sturgell, C NW NE Section 12-12n-11w, drilling at 1,185 feet.

(Continued on Page 207)

GASOLINE PLANT & REFINERY EQUIPMENT



CAPACITY AND FACILITIES FOR PROMPT DELIVERY

HIGH PRESSURE VESSELS

BUILT TULSA TYPE RIGHT

Tulsa Boiler & Machinery Co.

West Twenty-First Street & Union Avenue

TULSA, OKLAHOMA

Record Well in Shackelford County; Large One in Jones

By
D. H. STORMONT

FORT WORTH, Tex., Mar. 27.—Three-quarters of a mile northwest of the north end of the North Cowden pool in Ector County, and opening considerable territory to future development, Sinclair Prairie Oil Co. completed No. 1 Fay Holt for a daily potential of 561 bbls. after a shot of 370 quarts of nitroglycerin from 4,160 feet to 4,205 feet, total depth. Location is 440 feet out of the southeast corner of Section 1, Block A, P.S.L. Survey. Closely following, Gulf Oil Corp. staked a half-mile outpost to the west. The test will be No. 1 Holt, 330 feet out of the southeast corner of the east half of the same section.

Three new wildcats were staked in the southern portion of the basin, two in Pecos County and one in Winkler County, while a fourth was located in Stonewall County of middle West Texas. The new Pecos County operations are both by C. W. Williams. No. 1-H J. Eaton is in Section 1, Block 203, J. H. Handy Survey, and No. 1 Texas Pacific Land Trust is in Section 95, Block 3, Texas Pacific Survey. The new Winkler County test is Harding & Morgan No. 1 Jenkins-Gulf, in Section 13, Block 77, P.S.L. Survey. The Shell Petroleum Corp. staked a new wildcat in Stonewall County, No. 1 T. K. Smith being located in Section 143, Block 7, H.&T.C. Survey.

North Basin Area

Two Yoakum County wildcats continued to hold the interest of the Northern Basin area, Texas Pacific Coal & Oil Co. No. 1 Brownfield, Section 802, Gibson Survey, prospective 1½-mile north extension to the east side of the Denver pool, and a possible link between that pool and the Bennett area a similar distance to the northeast, was preparing to clean out. The hole had caved after being shot with 600 quarts in the pay zone from 5,065 feet to 5,125 feet. Total depth is 5,151 feet. When the pay had been penetrated, an estimated 50 bbls. of oil followed the tools out of the hole. Since that time the well continued to head at intervals until cavings sealed off the hole. Shell Petroleum Corp. No. 1 Waples-Platter, Section 616, 2 miles northeast of the Bennett pool, was drilling at 5,084 feet with cable tools after cementing casing at 4,991 feet.

In Hockley County, Honolulu Oil Corp. staked a south offset to the recent mile-northeast extension to the Slaughter pool drilled by Sid W. Richardson. The new location is 440 feet out of the northwest corner of Labor 4, League 40, Maverick County School Lands Survey. The Richardson well, No. 1 Coe, was given a final Railroad Commission gauge of 2,048 bbls. in 24 hours which is a correction of the previously reported initial. About a mile further northwest of Richardson's completion, that operator and the Sun Oil Co. are drilling below 315 feet in red rock at their No. 1 R. J. Denton, Labor 41, League 40, Maverick County School Lands Survey.

In Gaines County, Osage Drilling Co. and A. S. Everett No. 1 Dr. E. H. Jones, Section 20, Block 7-A, P.S.L. Survey, wildcat test, was drilling plug from 9⅝-inch casing cemented at 2,060 feet, with total depth of 2,095 feet. This wildcat is 1½ miles northeast of the Continental Oil Co. No. 1 Jones, Section 22, which was a failure after a small oil showing.

Scurry County

Two tests in Scurry County's new pool were in the testing stages as the week closed. Shot with 300 quarts from 2,380 feet to 2,450 feet, Paul C. Teas No. 1 W. P. Thompson, 1-mile northwest outpost, was swabbing. Oil was reported rising to 2,100 feet with each trip of the swab. No. 1 Thompson showed saturation from 2,380 feet to 2,447 feet and white lime from 2,456 feet to 2,460 feet, total depth. Location is in the northwest corner of Section 129, Block 97, H.&T.C. Survey. Coffield & Guthrie No. 1-A First National Bank of Snyder encountered the pay section at 3,040 feet, was treated with 1,000 gallons, and was still testing. Location is 330 feet out of the northwest corner of Section 129, Block 97, H.&T.C. Survey, 1,980 feet north of the W. E. Callahan No. 1 First National Bank of Snyder, second producer in the pool.

Concho County

Dry, sweet gas, estimated to be about 5,000,000 cu. ft. daily, was encountered from 1,918-22 feet in sand at the Clymore Co., Inc., No. 1 T. Y. Hill, southeast Concho County test 2½ miles southwest of Doole. Seven-inch casing was being underreamed to the top of the sand pending orders for a test of the section. Location is 2,310 feet from the northeast line of the J. Frederick Survey, No. 1694, Abstract 197.

WEST CENTRAL TEXAS

With an initial flow of more than 100 bbls. per hour, operators were scheduled to take a final Railroad Commission gauge over the week-end at the Owens-Snebold Oil Corp. No. 1 J. S. McKeever, quarter-mile northwest extension to the Ivy pool of northwestern Shackelford County. On its initial flow the well made 50 bbls. the first half hour and 68 bbls. the second half hour into tanks. Operators were tearing down the rig and moving the oil from the 800-bbl. storage battery in order to begin official gauge. Humble Pipe Line Co. began to lay a connection from its line out of the Ivy pool. The well promises to be one of the largest ever completed in Shackelford County. Its location is in Section 158, B.B.B.&C. Survey.

Wildcat oil production in the southwest part of Shackelford County will be sought by a test staked in the S. W. Jennings lands by J. H. Sprouls. It is in the 500-acre Jennings tract located 2 miles east of the pool opened last fall by Dewey Fox.

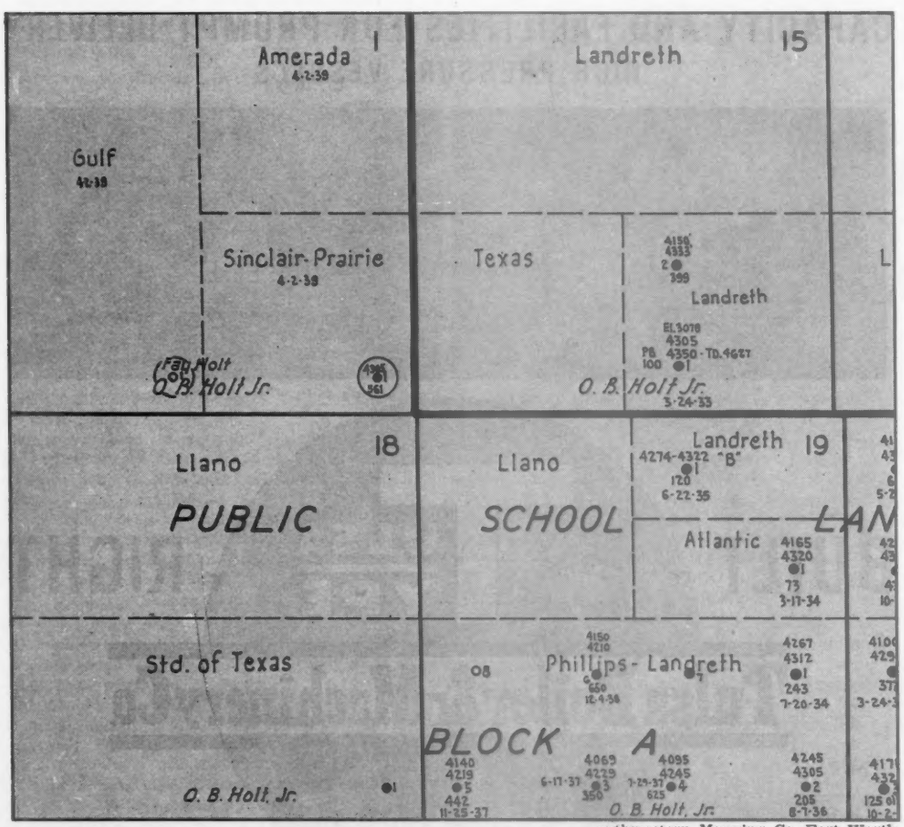
Jones County

A south outpost to the Griffin pool of Jones County, Falls Refining Co. No. 1 N. Smith, gauged more than 100 bbls. hourly on its Railroad Commission gauge to obtain a daily rating of 2,688 bbls. Production is from the Palo Pinto lime at a total depth of 3,265 feet. It is in the southwest of Section 199, B.B.B.&C. Survey. Ungren & Frazier also have a well ready for a gauge, No. 1 Smith having drilled the horizon from 3,243-51 feet.

In the new oil pool opened recently by Gregg Oil Co. No. 1 Appling, southwest corner of Section 32, Block 1, B.B.B.&C. Survey, in the northern part of the county, the second test for the area has been staked by the Grisham-Hunter Oil Corp. as its No. 1 Osment, west offset to the discovery and in Section 51, Block 1, B.B.B.&C. Survey.

At the present rate of drilling only a few more

(Continued on Page 198)



Southwestern Mapping Co, Fort Worth

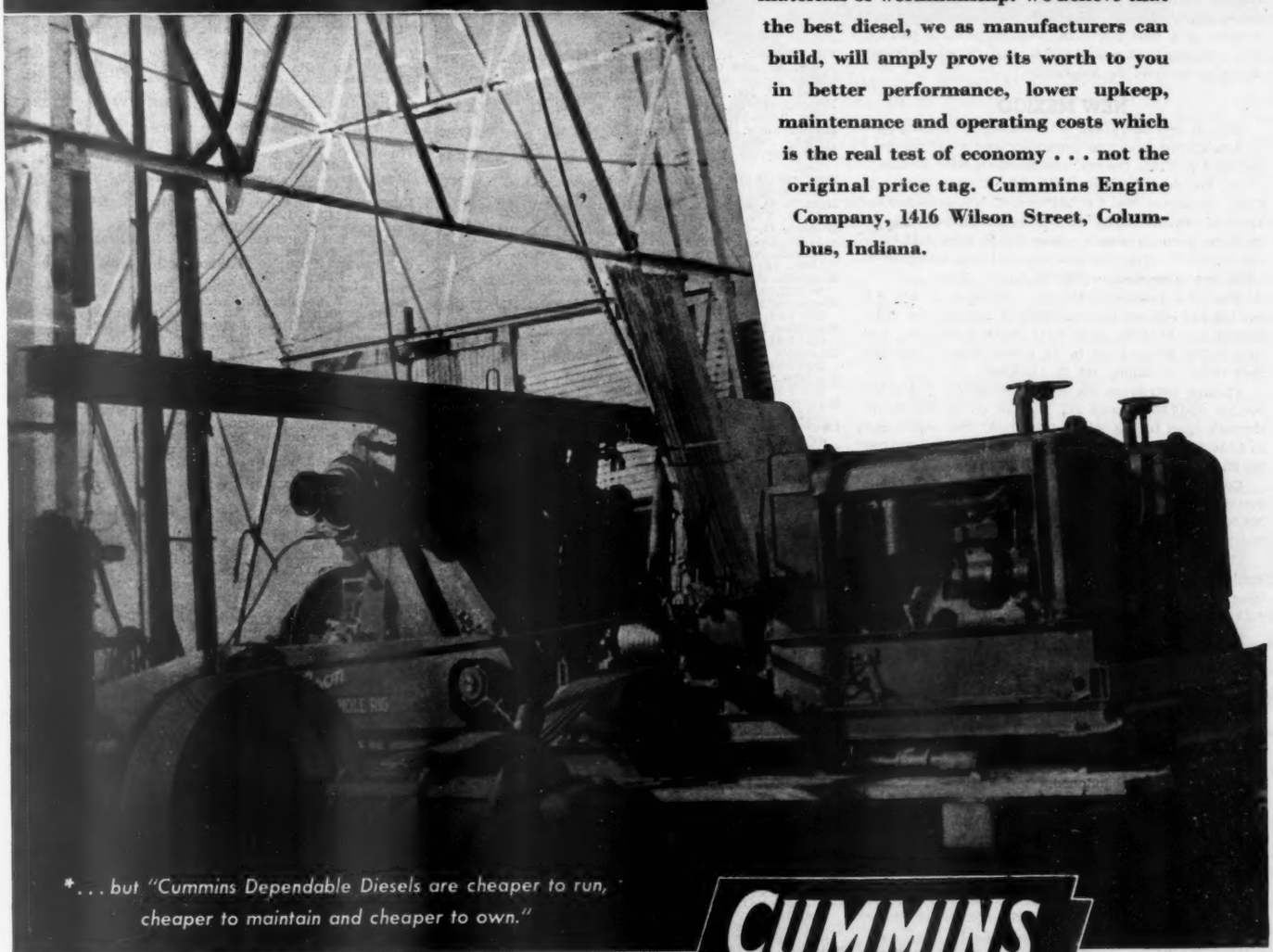
Sinclair Prairie Oil Co. has given the north end of the North Cowden pool of Ector County a three-fourths mile west extension and the Gulf Oil Corp. has staked a location a half mile further west

No... Cummins Dependable DIESELS Are Not Cheap*

They may never be . . . because we believe, and we think you'll agree, that cheap production is inconsistent with the precision methods, high standards for materials and close tolerances under which Cummins Diesels are built . . . and will continue to be built.

To assure you a diesel whose uniform performance will never find the going too tough . . . one that will always be the master of its job . . . demands a program of constant field-testing, improvement and refinement . . . with never a let-up.

We do not propose to stint on this development . . . to "let down the bars" on materials or workmanship. We believe that the best diesel, we as manufacturers can build, will amply prove its worth to you in better performance, lower upkeep, maintenance and operating costs which is the real test of economy . . . not the original price tag. Cummins Engine Company, 1416 Wilson Street, Columbus, Indiana.



*. . . but "Cummins Dependable Diesels are cheaper to run, cheaper to maintain and cheaper to own."

Mid-Continent Supply Company

Exclusive Distributors Mid-Continent Territory • FORT WORTH, TEXAS

In other oil fields—ask any representative of such well-known oil-field equipment manufacturers as: American Well & Prospecting Co. • Emsco • Ideco • Wilson • All Steel • Portable • Bridgeport, or Franks

CUMMINS Dependable DIESEL

PIONEER IN MODERN DIESEL DEVELOPMENT

Rocky Mountain Area

By T. R. INGRAM

250 Barrels in 3 Hours Made by Well in Eddy County, N.M.

DENVER, Colo., Mar. 27.—Opening of bids for first allotment of a total of 10,000,000 gallons of road oil to be used on state highways in Colorado in 1939 was postponed to April 6 to enable Wyoming refiners to determine whether they can meet specifications.

General Petroleum Corp. will go back into its discovery well on Cole Creek, Wyoming, and deepen it to test the Sundance. Argo Oil Co. had a good completion in Lance Creek in its No. 3 Ford, which flowed 85 bbls. an hour from the Leo sand. Ohio Oil Co. No. 5 Agnes Rohlff increased to 361 bbls. after acidizing. Lance Creek had one new location. Shallow sand at Shoshoni, in Fremont County, is to be tested as a result of core drilling operations.

Cut Bank had one completion, a 118-bbl. well in Glacier Production Co. No. 2 Scheuren, and one new operation. Whitlast gas field was extended three-fourths of a mile north in Western Natural Gas Co. No. 1 Iverson. Stanolind Oil & Gas Co. retired from active operations in Montana.

NEW MEXICO

Eleven producers and one failure were completed in Lea County and two producers and a failure were recorded in Eddy County, southeastern New Mexico.

In the South Eunice field, Lea County, Gulf Oil Corp. completed No. 3-E Mattern, C NW NW Section 12-22-36, which flowed 1,045 bbls. of oil naturally in 20 hours through 2-inch tubing set at 3,765 feet. Pay was found at 3,705 feet and the well was bottomed at 3,780 feet. Gas gauged 915,000 cu. ft. daily.

Magnolia Petroleum Co. No. 1-P State, C SW SE Section 22-17-35, on the east edge of the Vacuum field, topped pay at 4,285 feet, total depth 4,640 feet, and flowed 743 bbls. of oil in 24 hours through one-half inch choke on tubing set at 4,638 feet.

Phillips Petroleum Co. No. 24 Santa Fe, C NE NE Section 34-17-35, flowed 277 bbls. of oil in five hours through open tubing set at 4,588 feet. Pay was found at 4,528 feet, total depth 4,590 feet. Gas gauged 765,000 cu. ft. daily.

Continental Oil Co. No. 5 State H-35, C SW NE Section 35-17-34, flowed 48 bbls. of oil an hour, with 768,000 cu. ft. of gas, from pay topped at 4,460 feet. Total depth was 4,695 feet.

Humble Oil & Refining Co. No. 3-K State, C NE SE Section 28-17-35, had pay at 4,400 feet and after acidizing flowed 22 bbls. of oil an hour for six hours, with 384,000 cu. ft. of gas. Total depth was 4,650 feet.

Ohio Oil Co. No. 2 State-Staplin, C NE SW Section 30-17-35, found pay at 4,490 feet, total depth 4,710 feet, was acidized and flowed 18 bbls. of oil an hour. Gas volume was 500,000 cu. ft. daily.

Repollo Oil Co. No. 2 State, Lease 197, SE NE SE Section 6-17-34, was bottomed in sand and lime at 5,020 feet. There was a slight showing of oil in sand at 5,012 feet, but after bailing dry the hole filled with water and it was abandoned.

Bryant-Drilexco No. 2 State, SE SW SE Section 12-21-35, on the west edge of the Eunice pool, flowed 227 bbls. of oil daily through open 2-inch tubing. Pay was found at 3,825 feet and the hole was bottomed at 3,908 feet.

J. C. Clower No. 1-B Manda, NE NE NW Section 28-22-37, Penrose area, flowed 25 bbls. of oil daily from pay topped at 3,516 feet, total depth 3,681 feet.

Amerada Petroleum Corp. No. 1-B Stuart, NW SE NE Section 22-25-37, Langlie area, found best pay at 3,361-76 feet and 3,379-80 feet in sand, and after setting 2-inch tubing at 3,370 feet, flowed 111 bbls. of oil in 19½ hours. Total depth was 3,380 feet.

Continental Oil Co. No. 2 Jack B-27, C SW NE Section 27-24-37, had pay in sand at 3,435 feet and flowed 30 bbls. of oil an hour, accompanied by 800,000 cu. ft. of gas daily.

Same company's No. 4 Sanderson B-14, NE SW NW Section 14-20-36, found pay at 3,800 feet, total depth 3,827 feet, and flowed 5 bbls. of oil an hour. It was acidized and flow increased to 65 bbls. of oil an hour.

In Eddy County, Franklin Petroleum Co. No. 1 Ballard, NE NE SE Section 1-18-29, Maljamar district, topped pay at 2,780 feet and after shooting, flowed 250 bbls. of oil in three hours. Total depth was 2,828 feet.

J. H. Steinberger No. 1 Hastie, SE NE SW Section 18-17-28, Eddy County, was bottomed in lime at 552 feet and pumped 7 bbls. of oil and 2 bbls. of water daily.

English & Harmon No. 1 Stogner, NW NW SE Section 31-17-31, Eddy County, was bottomed at 4,252 feet, plugged back to 4,425 feet, was shot, bailed 2 bbls. of oil in 24 hours and was dry and abandoned.

Lea County

Fred Turner, Jr., No. 1 Lea Co. State Bank, C SW SW Sec. 30-14-33 (wildcat). Drlg. 1,475 ft.
Carper-Taylor No. 1 Taylor (wildcat), SW SW SW Sec. 36-16-32. Est. 500,000 cu. ft. gas; drlg. 3,397 ft.
Repollo Oil Co. No. 2 State, Lse. 182, C S½ NE SW Sec. 31-16-37. R.U.R.
Carper Drlg. No. 1 Simon, C NE NE Sec. 29-17-32. Spdg.
Cities Service No. 2-K State, C SE NE Sec. 27-17-35. Loc.
Continental Oil Co. No. 1-A Sanderson B-14, C N½ NW NW Sec. 14-20-36. W.O.C. 1,443 ft.
Humble O. & R. Co. No. 2-K State, C NW NE Sec. 32-17-35. T.D. 4,675 ft.; swb. 14 B.O. in 8 hrs.
Humble O. & R. Co. No. 4-K State, C NE SE Sec. 32-17-35. Drlg. 2,858 ft.
Magnolia Pet. Co. No. 2-P State, C SE SE Sec. 22-17-35. Drlg. 168 ft.
Magnolia Pet. Co. No. 3-J State, C SE NE Sec. 22-17-34. W.O.C. 4,350 ft.
Magnolia Pet. Co. No. 27 State-Bridges, C SE NE Sec. 26-17-34. W.O.C. 4,220 ft.
Magnolia Pet. Co. No. 28 State-Bridges, C NW NW Sec. 26-17-34. Drlg. 1,544 ft.
Magnolia Pet. Co. No. 29 State-Bridges, C SW SW Sec. 26-17-34. Drlg. 2,295 ft.
Maljamar O. & G. Co. No. 2-B Baish, C NE NE Sec. 27-17-32. T.D. 2,602 ft.; S.D.O.
Maljamar O. & G. Co. No. 2 Mitchell, SW SE SW Sec. 5-17-32. Fsg. 815 ft.
Ohio Oil Co. No. 1 State-Warn, C SE NE Sec. 33-17-35. W.O.C. 510 ft.
Phillips Pet. Co. No. 12 Santa Fe, C NE SW Sec. 28-17-35. T.D. 4,700 ft.; C.O. 4,675 ft.
Phillips Pet. Co. No. 15 Santa Fe, C NE NE Sec. 28-17-35. T.D. 4,700 ft.; C.O. 4,562 ft.
Phillips Pet. Co. No. 26 Santa Fe, C NE SW Sec. 29-17-35. T.D. 4,645 ft.; F. 162 B.O. in 16 hrs.
Phillips Pet. Co. No. 28 Santa Fe, C NE SE Sec. 33-17-35. Drlg. 4,256 ft.
Shell Pet. Corp. No. 1-C State, C NE SE Sec. 24-17-34. T.D. 4,733 ft.; pmp. 65 B.O. in 12 hrs. after setting 2 days.
Shell Pet. Corp. No. 1-V State, C NE SE Sec. 21-17-35. Rng. tbg. 4,680 ft.
Standard Oil Co. of Texas No. 2 State, Lse. 6, C NE SW Sec. 34-17-35. T.D. 4,649 ft.; F. 32 B.F. in 12 hrs., 15% wtr.
Stanolind O. & G. Co. No. 2 State, C SE NW Sec. 1-17-36. T.D. 4,830 ft.; S.O.
Texas Co. No. 2-S State, C SW SW Sec. 35-17-34. W.O.C. 1,600 ft.
Texas Co. No. 1-T State, C SE NE Sec. 25-17-34. T.D. 4,725 ft.; pmp. 5 B.O. and pmp. off; to C.O.
Texas Co. No. 2-T State, C SW SE Sec. 34-17-34. Drlg. 592 ft.
Twin Oil Corp. No. 1-D State, C SW NE Sec. 30-17-35. T.D. 4,700 ft.; pmp. 21 B.O. in 11 hrs.
Fullerton Oil Co. No. 1-A Walker, C SW NW Sec. 18-18-32. Drlg. 4,046 ft.
Phillips Pet. Co. No. 16 Santa Fe, C NW SW Sec. 5-18-35. Drlg. 4,986 ft.
Texas Co. No. 1-X State, C NE NE Sec. 3-18-34. Drlg. 1,140 ft.
P. B. English No. 1 Miller, C NE SE Sec. 18-19-32 (wildcat). T.D. 2,920 ft.; S.S.O. 2,785 ft.; sdy. L.
Great Western Prod. Co. No. 2 Bordages, NE SE NW Sec. 33-19-37. T.D. 3,931 ft.; R.U. pmp.
Continental Oil Co. No. 5 Britt B-15, SL NW NE SW Sec. 15-20-37. Drlg. 105 ft.
Stanolind O. & G. Co. No. 4-B Gilluby, NW NW NW Sec. 22-20-37. Drlg.
Texas Co. No. 17 Lieu-Lands, NW NW SW Sec. 19-20-37. Drlg. 3,150 ft.
Aloco Oil Co. No. 1 Carson, C SW SE Sec. 28-21-37. T.D. 3,560 ft.; reaming 3,440 ft.
Bryant-Drillexco No. 3 State, C S½ NW SE Sec. 12-21-35. Drlg. 1,011 ft.
Danglade & Clower No. 1 Corrigan, C NE SE Sec. 33-21-37. Drlg. 1,900 ft.
Danglade & Clower No. 1 Owen, NW SW SW Sec. 34-21-37. Drlg. 3,140 ft.
Gulf Oil Corp. No. 1-C Carson, C NE NE Sec. 33-21-37. Drlg.
Gulf Oil Corp. No. 1-C Leonard, C SE SW Sec. 36-21-36. Drlg. 1,010 ft.
Gulf Oil Corp. No. 2-B Mattern, C SE NE Sec. 31-21-37. T.D. 3,800 ft.; swbg.
Magnolia Pet. Co. No. 1 Marshall, C SE NW Sec. 34-21-37. T.D. 3,750 ft.; F. 67 B.O. in 4 hrs.
John G. Menke No. 2 Alexander, C NE NW Sec. 5-21-37. Drlg. 2,472 ft.
Francis C. Wilson No. 3 State, NW SE NE Sec. 7-21-35. T.D. 3,868 ft.; P.B. 3,690 ft.; set whipstock 3,672 ft.
Stanolind O. & G. Co. No. 4 Hill, C SW NE Sec. 6-21-37. T.D. 3,770 ft.; 1,200 ft. O.I.H. in 8 hrs.
J. C. Clower No. 1 Christmas, SE SE SW Sec. 28-22-37. C.&P.
Continental Oil Co. No. 1 State F-1A, C W½ SE NE Sec. 1-22-35. T.D. 3,949 ft.; P.B. 3,900 ft.; F. 7½ B.O. in 1 hr.
Continental Oil Co. No. 5 State J-2, C SE SE Sec. 2-22-36. R.U.R.
Continental Oil Co. No. 5 State E-17, C W½ NW SW Sec. 17-22-36. T.D. 3,827 ft.; fsg. ck.
Olean Pet. Co. No. 2 Farrell, SW SE SE Sec. 22-22-37. T.D. 3,757 ft.; P.B. 3,655 ft.; C.O. 3,635 ft.
Repollo Oil Co. No. 1-D State, Lse. 157, NW NW SW Sec. 12-22-36. Loc.
Skelly Oil Co. No. 7 Baker, C NW NE Sec. 27-22-37. Drlg. 2,930 ft.
Skelly Oil Co. No. 5 Simms, C NW SE Sec. 33-22-37. Drlg. 3,585 ft.
Texas Co. No. 2-B Fally, C SE SW Sec. 8-22-37. T.D. 3,720 ft.; P.B. 3,709 ft.; F. 22 B.F.P.D., 6% B.S.; S.I.
Texas Pacific C. & O. No. 15-A State, C N½ SE NW Sec. 11-22-36. Drlg. 700 ft.
Walter Donnelly No. 1 Davis, C SE NW Sec. 33-23-37. T.D. 3,600 ft.; tstg.
Great Western Prod. No. 2-B Leonard, C NW NW Sec. 32-23-37. Drlg.
Humble O. & R. No. 4 Williams, C NW NW Sec. 34-24-37. Drlg. 3,019 ft.
North Shore Oil Corp. No. 3 Woolworth, SW SW NW Sec. 33-24-37. R.U.S.T.
North Shore Oil Corp. No. 4 Woolworth, NW NW NW Sec. 33-24-37. Loc.
Parker Drlg. Co. No. 3 Erwin, C W½ NE SW Sec. 35-24-37. T.D. 3,460 ft.; F. 10 B.O. in 8 hrs.; est. 3,000,000 cu. ft. gas.
Phillips and Pure No. 5 Woolworth, C SW SE Sec. 33-24-37. Drlg. 1,525 ft.
Phillips and Pure No. 6 Woolworth, C NE NE Sec. 33-24-37. T.D. 3,541 ft.; S.I.
Schermerhorn Oil Co. No. 5 Woolworth, NW SW NE Sec. 28-24-37. Drlg. 3,478 ft.; F. 20 B.O.P.D.
Schermerhorn Oil Co. No. 6 Woolworth, C SW SE Sec. 28-24-37. T.D. 2,952 ft.; to D.D.
Shasta Oil Co. No. 1 Woolworth, NE NE NW Sec. 28-24-37. T.D. 3,601 ft.; tstg.
Weir Drlg. Co. No. 3 Woolworth, NE SW SW Sec. 28-24-37. Fsg. 3,195 ft.
Anderson & Prichard No. 5 Wells, C NW NE Sec. 5-25-37. Drlg. 3,100 ft.
Anderson & Prichard No. 1 Woolworth, NW NE NE Sec. 17-25-37. T.D. 3,000 ft.; rng. tbg.
Culbertson & Irwin No. 3 Henry, SW SW SW Sec. 26-25-37. T.D. 3,418 ft.; to swb.
Italo Pet. Corp. No. 1 Carlson, SW NE NW Sec. 26-25-37. Drlg.
Italo Pet. Corp. No. 3 Carlson B-27, NE SE SE Sec. 27-25-37. Loc.
Italo Pet. Corp. No. 1 Indian B-4, NE NW NW Sec. 4-25-37. T.D. 3,543 ft.; est. 150 B.O.P.D.
Italo Pet. Corp. No. 2-B N. M. Pet., SE SW NW Sec. 4-25-37. W.O.C. 3,350 ft.
Phillips and Pure No. 2 Woolworth, C SE NE Sec. 6-25-37. Drlg. 3,412 ft.
Richmond Drlg. Co. No. 2-A State, C SW SW Sec. 2-25-37. W.O.C. 3,315 ft.
Sam Weiner No. 3 Smith, C N½ NE SE Sec. 4-25-37. T.D. 3,506 ft.; C.O. 3,490 ft.

Eddy County

Allen, Fair & Pope No. 1 Snowden, SE NE SE Sec. 36-17-29. S.D. rprs. 2,393 ft.
Aston & Fair, Inc., No. 1 Hudson, C NE NE Sec. 18-17-31. Drlg. 2,945 ft.
W. H. Berry No. 1 Berry, NE NE NE Sec. 24-17-27. Drlg. 515 ft.
Hammond & Sons No. 1 Ployhar-State, SW SW SE Sec. 16-17-28. S.D.O. 1,966 ft.
J. O. and J. H. Hammond No. 1 Paris, NE NW NW Sec. 5-17-29. S.D.O. 25 ft.
Flint Prod. Co. No. 1-L Dexter, SE NW SE Sec. 15-17-30. Swb. 32 B.O.P.D.; drlg. 3,622 ft.
F. G. Keyes No. 3 Red Gulch, NW NW NE Sec. 16-17-28. Drlg. 1,950 ft.
Ohio Oil Co. No. 4 State-McCallister, Sec. 25-17-34. W.O.C. 510 ft.
Plains Prod. No. 1 Daugherty (wildcat), SE SE SE Sec. 11-17-27. Drlg. 80 ft.
C. S. Powell No. 1 Smith, NW NW NE Sec. 6-17-29. Drlg. 2,671 ft.
Repollo Oil Co. No. 5-A Parke, NW NE NW Sec. 22-17-30. Drlg. 1,905 ft.
Repollo Oil Co. No. 4-A Keel, SE NE SW Sec. 7-17-31. Drlg. 2,150 ft.
Repollo Oil Co. No. 3 West, NE NE NE Sec. 3-17-31. Drlg. 245 ft.
J. H. Steinberger No. 2 Hastie, SW SW SW Sec. 18-17-28. C.&P.
Welch & Welch No. 1 State, NE NE SE Sec. 20-17-28. T.D. 1,970 ft.; tstg.; swb. and F. 50 B.O.P.D.
Adkinson Oil Co. No. 1 Brainard, SE SW SE Sec. 5-18-27. S.D. rprs. 1,442 ft. (last report).
Barney Cockburn No. 1 State-Graham, C NE NE Sec. 16-18-31. Drlg.

Farmer & Tallmadge No. 1 Hubbell, NE SW Sec. 4-18-25. T.D. 400 ft.; fsg. bit.
Franklin Pet. Corp. No. 1 Canfield, NW NW NW Sec. 7-18-30. M.I.M.
Green Bay Oil No. 1-A Johnson, C SE SE Sec. 11-18-31. T.D. 3,775 ft.; shot; 1,000 ft. O.I.H.
Harvey E. Yates No. 1 Travis, NE SE SE Sec. 6-18-29. T.D. 2,496 ft.; S.S.O.; to D.D.
H. W. Martin No. 1 Gates, SW SE SE Sec. 15-18-30. Loc.
Martin Yates No. 1 Saunders, NE NE NE Sec. 12-18-29. Drlg. 270 ft.
Carper Drlg. Co. No. 1 Quillen, C NW NE Sec. 12-19-31. S.D.9. 2,765 ft.
Geo. E. Robb No. 1 Cannon, C SW SE Sec. 4-19-30. T.D. 230 ft.; S.D.O.
Geo. E. Robb No. 1 Vandagriff, SW NE Sec. 6-19-31. T.D. 800 ft.; S.D.O.
R. C. Underwood No. 1 Quillen-Bruce, NE NE SE Sec. 4-19-31. Drlg. 3,592 ft.; O.I.H.
Martin Yates, Jr., No. 1 Bowers, SW SE SE Sec. 31-19-27. T.D. 1,180 ft.; est. 25-40 B.O.P.D.; tstg.
Trojan Oil Co. No. 1 Grant, SW SW NE Sec. 33-20s-25e. S.D.O. 408 ft.
C. F. Ingram No. 1 Page, NE NE SW Sec. 15-21-28. T.D. 2,978 ft.; fsg.
Barnett Oil Dev. Co. No. 1 King, C NW SE Sec. 23-26-30. Drlg. 3,105 ft.

Chaves County

Mac T. Anderson No. 1 Warnock, C SW SE Sec. 17-15-27. Loc.
Nay Hightower No. 1 Billingslea, C SW NE Sec. 28-11-30. T.D. 3,237 ft.; to D.D.
New Russell & Wood No. 1 Sterrett (wildcat), NW SE NW Sec. 29-11-25. S.D. rprs. 160 ft.
Tarkenton Bros. No. 1 Peters, SE SE NW Sec. 33-11-25. Drlg. 399 ft.
Western Minerals, Inc., No. 1 Dow (wildcat), C SW NW Sec. 27-10-30. Loc.

De Baca County

N. E. Woods No. 1 Jones, C NE SW Sec. 17-4n-20. T.D. 620 ft.; S.D. rprs.
James D. Ward No. 1 Summers, SE NE SW Sec. 15-4n-24e. T.D. 680 ft.; S.D.O.

Roosevelt County

Shell Pet. Corp. No. 1 Harwood, C S½ SE SE Sec. 27-7s-35e. Drlg. 7,250 ft., sh.

NORTHWEST NEW MEXICO

Bernalillo County

Norins Realty Co., Inc., No. 2 Pajarito, Sec. 22-9n-1e. S.D. 1,100 ft.

San Juan County

The Continental Oil Co. No. 88 Rattlesnake, CNL NE NE Section 2-29n-19w, Rattlesnake pool, was completed in the Dakota at 760 feet for 34 bbls. per day.
Jack Amenda No. 1 Schenck, NE NE Sec. 14-29n-13w. Drlg. 650 ft.

San Miguel County

Ben E. Keith No. 1 McCune, SW SE SW Sec. 32-16n-12e. R.O.G. (first report).
Southwest Drilling Co. No. 1 Conchas, NW NE Sec. 34-17n-21e. Drlg. 1,600 ft.

Valencia County

C. A. Grober et al No. 1 Fuqua, NE NE Sec. 19-5n-3e. Cg. 1,340 ft.
Joiner Oil Corp. No. 1 San Clement, C NE SE Sec. 23-7n-1e. Drlg. L. 5,610 ft.

COLORADO

The opening of bids on the first allotment of 10,000,000 gallons of oil for surfacing Colorado state highways in 1939, scheduled for March 16, was postponed until April 6 following a meeting at Denver which was attended by Gov. Ralph Carr, officials of the Denver Chamber of Commerce, a delegation of Wyoming business men, and C. D. Vall, state highway engineer, and other officials of the highway department. This was done in order to give Wyoming producers of road oil an opportunity to determine if they could produce oil which came up to the specifications of the highway department. These specifications set a viscosity index factor of 70, a point which, it was alleged, would shut out the Wyoming refiners in favor of California companies. The controversy over the use of California oils has been in progress for several years and last year considerable Wyoming oil was used upon the insistence of Colorado and Wyoming business men. Heretofore purchases have been made direct by the Highway Department, but a recent Supreme Court decision makes it obligatory that the purchases be made through the State Purchasing Department. This change was considered favorable to more competitive bidding, except for the preparation of the specifications, the factor that will be tested out during the interval allowed by the postponement of the opening of bids.

Boulder County

Reynolds & Rohr No. 1 Thomas, SW SW Sec. 17-1n-70w. Drlg. 1,565 ft. in basal Hygiene sd.; S.G.

Fremont County

Waterville Oil Co. No. 1 Persons, CWL NE NE Sec. 17-18s-69w. Drlg. 110 ft.

La Plata County

Nick Spatter No. 1-X Bryce, SE SW SW Sec. 31-33n-9w. T.D. 2,352 ft.; U.R. 8¼-in. to 2,350 ft.

Moffat County

MacKinnie Oil & Drlg. Co. No. 1 Coles, SW SW SE Sec. 1-3n-92w. T.D. 3,170 ft.; U.R. 8¼-in. to bttm.

Park County

South Park Oil Co. No. 1 Leman, NE NE SE Sec. 34-

Pumps
414,000
Barrels of Fluid
★
Total Repairs
11,600 Hours
Only $3.80

Replacing a single-cylinder engine whose crankshaft still serves as countershaft, this Model LE Case oil field engine works 24 hours a day taking 805 barrels of oil and water from a 2350-foot well for Coffield and Guthrie, Inc., of Corsicana, Texas. Their records show that in 11,600 hours the only repair or replacement has been one set of spark plugs and one fan belt at a total cost of $3.80.

"This engine is using only about half a pint of oil in 24 hours, and we expect the original cylinder sleeves to be good for at least a couple more years," writes W. S. Guthrie. "Operating some 450 pumping wells we naturally have experience with various makes of pumping engines. Our Case engines are showing lower repair and maintenance cost than any others we have operated, and we have never lost any production due to engine trouble since they have been in service."

See for yourself the secrets of this amazing economy. Write or phone nearest office for full information.

J. I. CASE CO., Racine, Wis.

Distributed and serviced in Mid-Continent field by Southwest Equip. Co. Dallas and Kilgore, Texas

Stocks at Dallas, Houston, Kilgore, Texas; Oklahoma City, Oklahoma; Shreveport, Louisiana; Wichita, Kansas

CASE OIL FIELD ENGINES

Where gauges live a hundred years in a day. Gauges from each production group are subjected to terrific vibration on this "torture rack."

We don't recommend abuse, BUT-

• We do know that gauges in the oil country often have to take it. That is why Marsh Gauges from every production group are subjected to far more punishment than they will ever receive in service. One of these tests — "the torture rack" — is illustrated opposite. On this device gauges are subject to terrific vibration. A gauge that can stand an hour of this, can stand a lifetime of field service — and Marsh Gauges can take this and other equally arduous tests.

Only Marsh Gauges combine the "Recalibrator," the "Mastergauge" movement, the "Unit Construction," the even graduations, and many other refinements. The Marsh line includes gauges for blenders, boilers, burners, capping, Christmas trees, columns, heaters, hydrogen units, pumps, Reid vapor bombs, scrubbers, separators, slush pumps, stills, towers, and other applications in all branches of the petroleum industry.

JAS. P. MARSH CORP., 2065 Southport Ave., Chicago, Ill.

MARSH GAUGES

11s-75w. Drlg. 6,850 ft. (C.O.); S. free O.; 31% dist.

Pueblo County

Eden O. & G. Co. No. 1 Horse Creek, SW SE Sec. 29-19s-64w. T.D. 2,060 ft.; W.O. 5½-in. csg.; will not run 4⅞-in.

WYOMING

Albany County

G. R. McConnell-J. L. Gaylord No. 1 Fuller, NW NE NE Sec. 7-15n-75w. T.D. 995 ft.; prep. to shoot Muddy sd. at 868-905 ft.

Big Horn County

Yale Pet. Corp. No. 2 Yates, Lot 57 (NW SW) Sec. 34-56n-97w. Drlg. 360 ft.; cmtd. 15½-in. at 87 ft.
Mule Creek Oil Co. No. 1 Sessions, Lot 53 (NW NW) Sec. 34-56n-97w. Drlg. 910 ft.; 15½-in. at 85 ft.
A. L. Rankin No. 1 Karjala-Rankin, C SW NW Sec. 10-54n-94w. Drlg. 660 ft.
Frank S. Scott No. 1 Robertson, SE SE SE Sec. 6-54n-93w. S.D. 50 ft. acct. weather.
Clifford S. Johnson No. 1 Johnson, CEL NW NW Sec. 24-51n-93w. S.D. 553 ft. for csg.; S.O.&G. 475-92 ft.

Carbon County

Sinclair-Wyo. Oil Co. No. 2-A Mahoney Unit, C SW NE Sec. 34-26n-88w. T.D. 4,326 ft.; fsg. 115 ft.; D.P. twisted off.
Producers Oil Co. No. 1 Lake Valley, CNL Sec. 14-20n-88w. Drlg. 1,940 ft.

Converse County

The Wyore Co. No. 2 Mary Gaspar, CNL NW SW Section 25-32n-69w, in the Shawnee district, was abandoned at 750 feet. It was drilled to this depth by the New Era Fuel Co. and was not tested, but estimated for 40 bbls. per day. Upon being taken over by new interests and cleaned out, it failed to respond.

Fremont County

Hall & Oliger, under an agreement with the Yellowstone Oil Co., is drilling a test to the basal Tertiary sand in the Wind River formation on the Shoshoni anticline 6 miles east of Shoshoni in No. 4 Government. A substantial show of oil at a shallow depth in a series of core holes drilled for geological data caused the decision to drill this hole deeper as a test for oil.

Hall & Oliger No. 4 Govt., SW SW SW Sec. 27-38n-93w. Drlg. 900 ft.; 8¼-in. at 460 ft. (first report).

Lincoln County

H. C. Harris et al No. 1 Govt., SE NW NW Sec. 23-21n-117w. Drlg. 1,570 ft.

Natrona County

The General Petroleum Corp. is rigging up rotary to deepen its No. 1 Government, the discovery well on Cole Creek, to the Sundance sand. It was completed in June, 1938, at 8,020 feet, 3 feet in the Morrison, for 250 bbls. per day from the Lakota sand at 7,978-8,019 feet. Subsequently rig was moved a mile to the north where No. 1 State was drilled. It was abandoned last week after finding a good sand in the Sundance, but which was barren of oil or gas. The Sundance is expected in No. 1 Government at around 8,500 feet.

General Pet. Corp. No. 1 Govt., C NW SE Sec. 21-35n-77w. T.D. 8,020 ft.; R.U.R. to D.D.
Summit Oil Co. No. 2 Govt., NW NE NE Sec. 21-33n-80w. Drlg. 75 ft.
Richland Corp. No. 1 State, SW NW Sec. 36-36n-81w. R.U.C.T.

Niobrara County

The Argo Oil Co. had a good completion in Lance Creek in its No. 3 Ford, SW SW NW Section 33-36n-65w, which flowed at the rate of 85 bbls an hour at 5,297 feet, total depth, from the Leo sand at 5,245-97 feet, elevation 4,413 feet. It is an inside well and is an old Sundance sand producer drilled deeper.

The Ohio Oil Co has a completion in the Sundance in its No. 5 Agnes Rohlff, reported last week as making 155 bbls per day, which made 361 bbls initial production after acidizing with 500 and then 1,500 gallons. Sand was at 3,825-3,920 feet. Rotary table elevation, 4,388 feet.

Ohio Oil Co. has made location for No. 12 Carrie Putnam in Section 4, an inside well. Location for No. 11 Carrie Putnam, SE SE SW Section 33-36n-65w, which was released last month, has been suspended.

Ohio Oil Co. No. 12 Carrie Putnam, NW SW NW Sec. 4-35n-65w. C.&P. (first report).
J. E. Manning No. 1 Hewitt-Govt., NW SW SW Sec. 4-35n-65w. Prep. to spd.
Minnelusa Oil Corp.-MacKinnie O. & D. Co. No. 5 Thompson, SE SE NW Sec. 7-35n-65w. Drlg.; M.I.M.
Ohio Oil Co. No. 3 Agnes Rohlff, C SE NE Sec. 32-36n-65w. Drlg. 4,560 ft.
Continental Oil Co. No. 3-B Dielman, SW SE NW Sec. 8-35n-65w. Rig; W.O. equip.
Continental Oil Co. No. 2 E. Rohlff, NW SE NW Sec. 32-36n-65w. Drlg. 2,915 ft.
Minnelusa Oil Corp. No. 2 Joss, SE NE SW Sec. 6-35n-65w. T.D. 3,989 ft.; drlg. on iron at 3,906 ft.
Minnelusa Oil Corp. No. 3 H. & M.-5, NW NE SE Sec. 7-35n-65w. Drlg. 4,245 ft.
F. F. Hintze et al No. 1 Wright-Govt., C NW SE Sec. 30-36n-63w. T.D. 4,964 ft.; recmtg. to test Muddy sd.
Fall River Roy. & Prod. Co. No. 1 Govt., CSL SE SE Sec. 35-40n-61w. T.D. 1,000 ft.; fsg. bailer.
Continental Oil Co. No. 1 Delahoyde, CNL NE NE Sec. 25-37n-63w. T.D. 4,118 ft.; R.U.R. to D.D.

Sublette County

Texas Co.-Frontier Pet. Co. No. 1 Govt. Unit, SE SE SW Sec. 1-28n-114w. T.D. 6,247 ft.; redrlg. 5,640 ft.

Sweetwater County

Sinclair-Wyo. Oil Co. No. 63 Lost Soldier, NW NE NE Sec. 10-26n-90w. Drlg. 560 ft.
Sinclair-Wyo. Oil Co. No. 82, NE SW SW Sec. 11-26n-90w. T.D. 2,214 ft.; cmtd. 5½-in. 2,213 ft.; prep. to perf.

Uinta County

Drusilla Connell No. 6 Govt., C NW NW Sec. 24-15n-118w. S.D. 180 ft.

MONTANA

Carbon County

R. C. Tarrant is starting another test in the Roscoe district in his No. 3 Government, a west offset to No. 2, which was abandoned recently at 3,120 feet after encountering 700 feet of heavy oil in the Muddy sand. It ran out of hole and could not reach the underlying sands which usually carry light oil.

R. R. Tarrant No. 3 Govt., C SW NW Sec. 4-6s-18e. R.U. (first report).
Alex Beaton No. 1, CSL SE SE Sec. 23-6s-23e. Drlg. 1,596 ft.
Miracle Oil Co. No. 2 Govt., CWL NE SE Sec. 3-6s-23e. T.D. 2,381 ft.; C.O. 1,550 ft.; to run 5½-in.

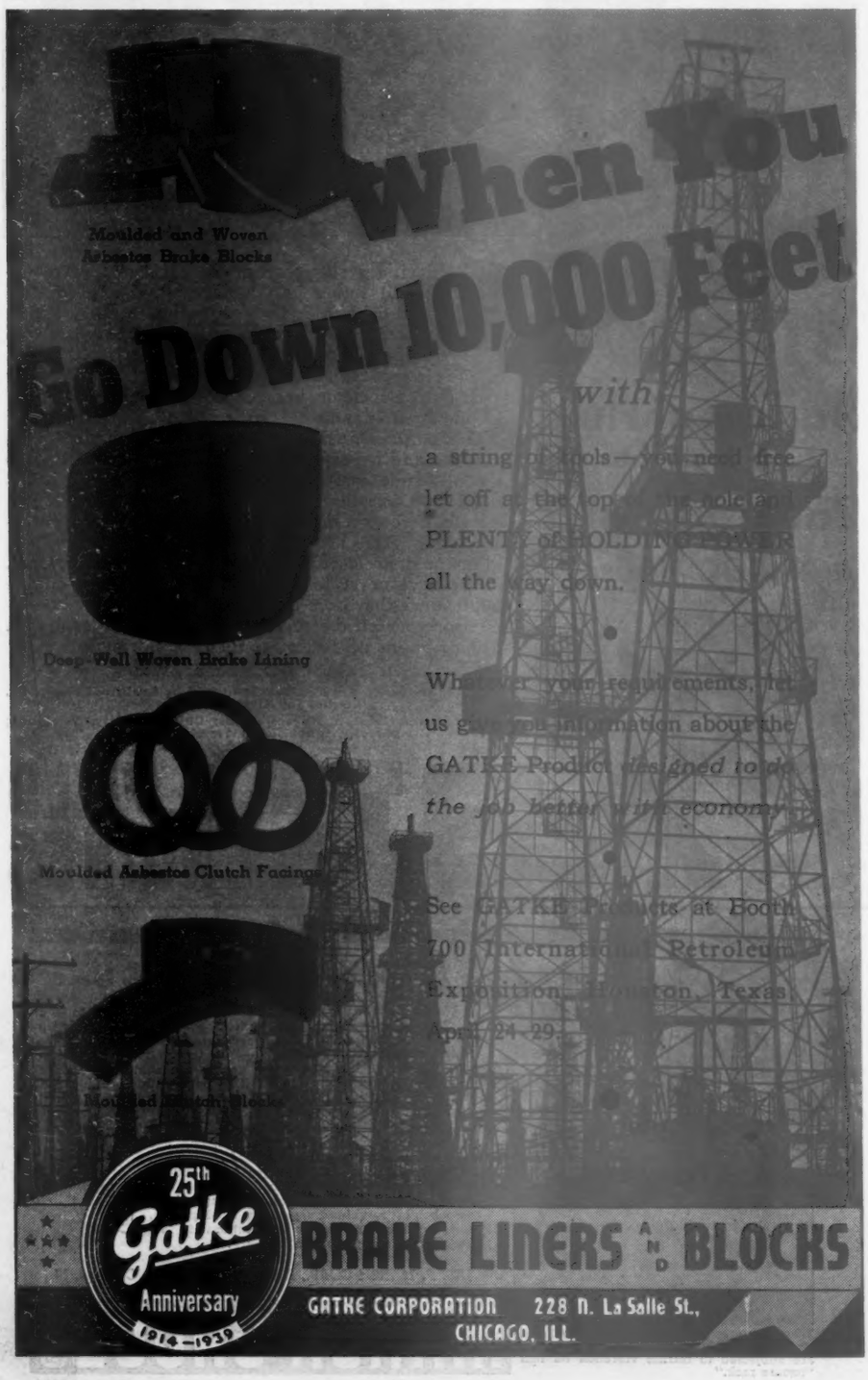
Glacier County

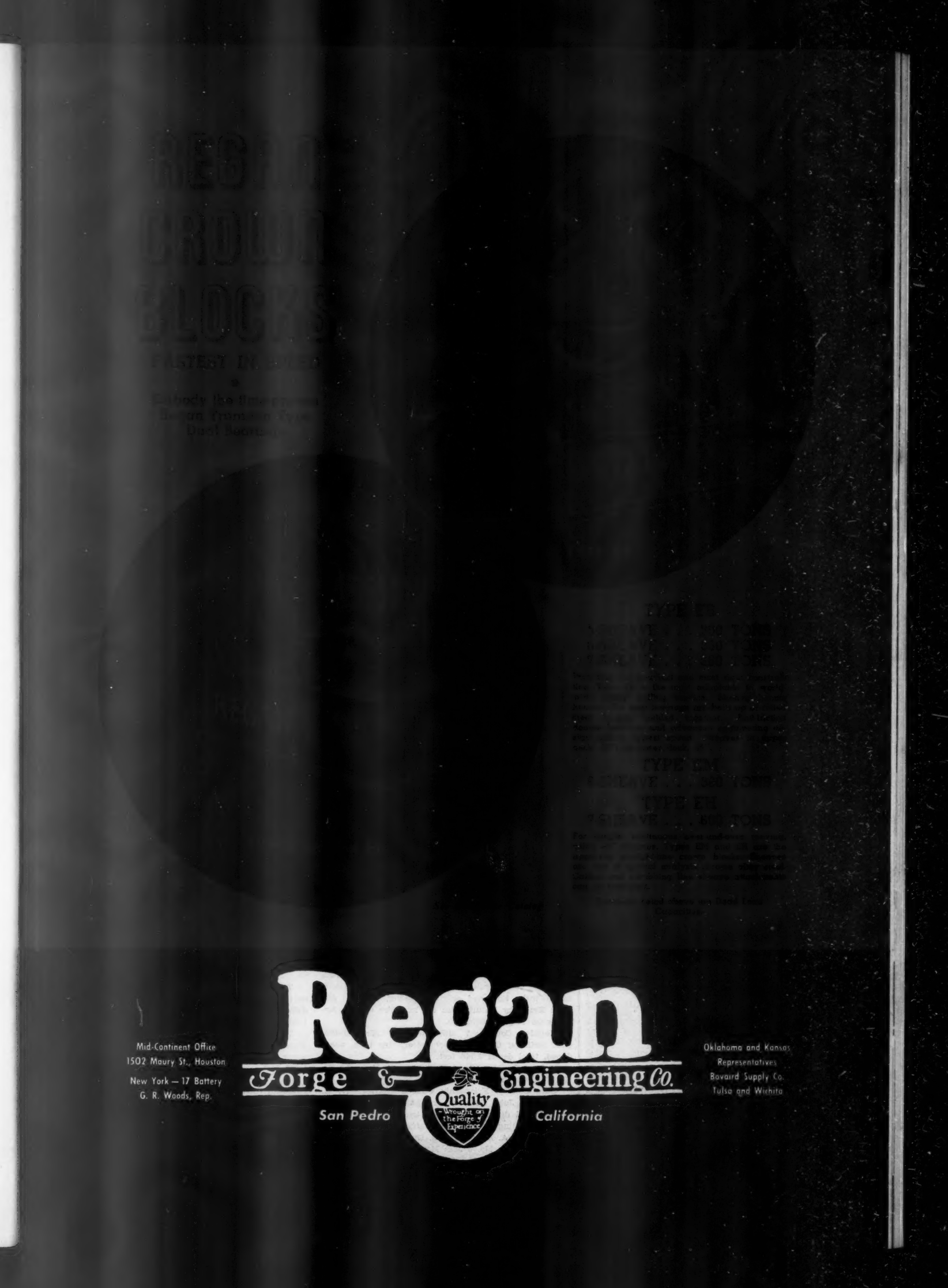
Cut Bank had one completion and one new operation. The Glacier Production Co. No. 2 Scheuren, C SW SW Section 20-33n-5w, swabbed 118 bbls. first 24 hours at 3,065 feet, total depth, from the Cut Bank sand at 3,034-65 feet. The Sunburst at 2,998-3,011 feet was dry.

Glacier Prod. Co. No. 3 Miller, C NE NE Sec. 29-33n-5w. R.U. (first report).
Tarrant-Wiley No. 3 Jones, SW NW SW Sec. 31-34n-5w. Spdg. 100 ft.
Tarrant-Long No. 7 Miller, NE SW NE Sec. 24-34n-6w. Drlg. 1,800 ft.
Glacier Prod. Co. No. 1 Bliesener Unit, SE SE NE Sec. 3-33n-5w. Drlg. 2,140 ft.
Glacier Prod. Co. No. 4 Simero, C NE NW Sec. 5-33n-5w. Drlg. 2,752 ft.; 7-in. at 2,745 ft.
Yukon Oil Co. No. 2 Lungren, C NE NW Sec. 26-37n-5w. Drlg. 2,020 ft.
Santa Rita O. & G. Co. No. 9 Tribal, NE SE NE Sec. 16-35n-6w. Drlg. 2,865 ft.; 8¼-in. at 2,665 ft.
Wm. Hanlon No. 4 All.-128, SW SE NE Sec. 12-32n-6w. Drlg. 2,635 ft.

Liberty County

The Whitlast gas field was extended three-fourths





Mid-Continent Office
1502 Maury St., Houston
New York — 17 Battery
G. R. Woods, Rep.

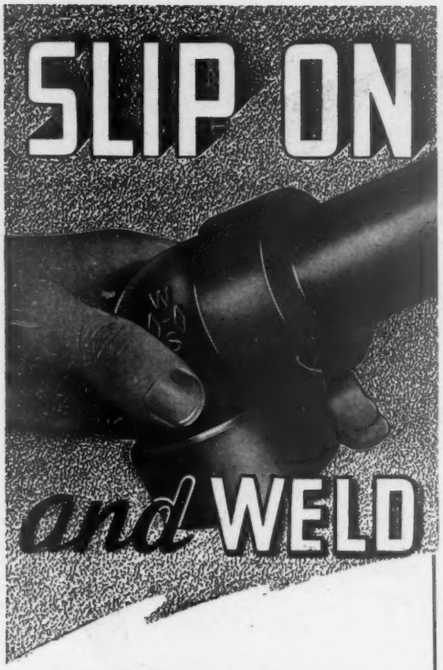
Regan

Forge & Engineering Co.

Quality
Wrought on the Forge of Experience

San Pedro California

Oklahoma and Kansas
Representatives
Bovaird Supply Co.
Tulsa and Wichita



W-S Forged Steel Welding Fittings offer a time saving method of application, just slip on and weld. Beveling of pipe ends is not required; tack welding and the use of special fixtures for lining up and holding are eliminated.

With W-S Fittings the socket end supports the pipe and provides for positive alignment. The position of the weld facilitates the welding operation and also removes the danger of the formation of welding icicles. This together with the fact that the bore of the fitting matches the bore of the pipe assures unobstructed flow.

W-S Fittings are not only easier to install, they are more dependable in service. Bored from solid forgings of ample proportions, walls are of uniform thickness assuring a high factor of safety when used under extreme pressures and temperatures.

For complete information write to—
The Watson-Stillman Co.,
Roselle, N. J.

of a mile to the north in the Western Natural Gas Co. No. 1 Iverson, CSL NW SE Section 9-37n-4e, which was completed in the Colorado shale at 1,688 feet for 7,500,000 cu. ft. per day. Location is three-fourths of a mile north and west of No. 1 Wallace, which was completed in the Sunburst at 1,970-80 feet in 1935 for 4,000,000 cu. ft., and same distance north and east of No. 1 State, which made 13,775,000 cu. ft. initial from the Sunburst at 2,045 feet.

A. W. Peterson, organizer of the company and president, was reported recently to have sold his interest in Western Natural Gas Co. Gas is sold to the Montana-Dakota Utilities Co. which pipes it to Great Falls. Company has drilled 20 wells, and acquired four others, of which 10 are now producing gas and five are oil wells. Limits of the productive area have been defined only on the southeast.

Petroleum County

H. Clark Rowland No. 1 Brundidge-Mink, SE NW Sec. 35-14n-25e. Drlg. 325 ft.
Nelson Story-Hogan, Ltd., No. 1 Austed, SW NW SE Sec. 22-13n-28e. Drlg. 1,265 ft.; carrying 10-in. (formerly Watson Oil Co.)

Pondera County

W. E. Rice, of Great Falls, head of the Home Oil & Refining Co., is reported to have acquired the holdings of the Stanolind Oil & Gas Co. in the Pondera field, consisting of 50 wells, with an estimated potential of 300 bbls. per day, and 2,800 acres of land. An 80,000-bbl. tank partly filled with storage oil was not included. The deal apparently marks the retirement of the Stanolind company from active operations in Montana, it having previously disposed of its properties in Big Lake, Cat Creek and Kevin-Sunburst. Pondera had 159 pumping wells at the end of 1938 and production during the year was 212,772 bbls., a daily average of 584 bbls. Total production to end of 1938 was 5,078,150 bbls. Year of maximum production was in 1929 when output was 1,010,491 bbls.

Morton-Cloutier No. 1 Hagan, C SE SE Sec. 5-31n-7w. T.D. 450 ft.; fsg. tools.

Teton County

Zodiac Oil Co.-Gulf States Oil Co. No. 1 Kellogg, NE NW NE Sec. 33-28n-5w. T.D. 2,470 ft.; prep. to run 4½-in.

Toole County

G. & A. Oil Co. No. 14 Goeddertz, NE SE SW Sec. 23-35n-3w. Loc.
A. E. Crumley & Son No. 15 Fryberger, NE NW SE Sec. 24-35n-3w. Drlg. 1,633 ft.; S.O. in contact at 1,596-1,607 ft.
Big West Oil Co. No. 10 Gunderson, 1,980 ft. from WL and 1,100 ft. from NL, Sec. 19-35n-2w. S.D. 1,610 ft.; contact 1,608-10 ft.; small S.O.; will acd. later.
Fulton-Commonwealth No. 2 Thompson, SE NW SE Sec. 28-35n-3w. T.D. 1,670 ft.; 6⅝-in. cmtd.
G. M. Plotke No. 2 Ward, SW cor. Sec. 28-35n-3w. T.D. 1,694 ft.; S.O. with 140 lbs. gas pr. in contact at 1,689-94 ft.
Kippen O. & G. Co. No. 1 Thompson, C NE SE Sec. 28-34n-1e. S.D. 575 ft.
Coolidge & Coolidge No. 3-A State, NW NE NW Sec. 36-36n-2w. T.D. 1,582 ft.; fsg. bit.

UTAH

Cane Creek Oil Co. No. 1 Govt., NW SW Sec. 31-26n-21e. Drlg. blk. stky. sh. 3,170 ft.; S.G. through H.F.W.

Kentucky Fields

(Continued from Page 186)

Wana Oil Co. No. 8 Ethel Chapman, dry hole, total depth 1,179 feet. Cane Run Petroleum Co. No. 10 R. E. Jackson, rigging up. Utica district: Walter Cameron and others No. 1 W. W. Davis, drilling at 137 feet. Birk City district: Kentucky-Missouri Oil Co. No. 1 Jones Heirs, 75-bbl. well, Jett sand at 1,253-69 feet. St. Joseph School district: Radio Drilling Co. No. 1 Mozelle Merrimee, moving in.

Henderson County, Birk City district: Aetna Oil Service Corp. No. 2 Monroe Pitts, 25-bbl. well from Jett sand, total depth 1,738 feet; plugged back to Jett, as McClosky lime had only a showing. Corydon district: Kentucky Natural Gas Co. and Sun Oil Co. No. 2 George Trigg, moving in.

Hopkins County, 7 miles west of Madisonville: Gulf Refining Co. No. 1 Schmetzer, dry hole, abandoned, total depth 4,548 feet.

McLean County, Island district: South Penn Oil Co. No. 8 Alma Nall, location.

Ohio County, Friendship Church district: W. E. Neal No. 5 John Bellamy, dry hole, total depth 608 feet. Buford district: A. Teller, trustee, No. 3 G. W. Hoover, drilling at 950 feet. Taffy district: Ohio Oil Co. No. 22 J. A. Kirk, location. Dundee district: W. E. Neal and others No. 6 Jess Mattingly, moving in; W. E. Neal and others No. 7 J. C. Nabors, spudding in; No 6 J. C. Nabors, 10-bbl. well, Jett sand 503½-15 feet; Murphy & Vickers No. 4 Arvis Wedding, dry hole, total depth 320 feet.

EASTERN KENTUCKY

ASHLAND, Ky., Mar. 27.—One completion and three new locations are included in the report of the eastern Kentucky operations this week.

The Kentucky West Virginia Gas Co. completed No. 5251, on the C. W. Preece land, on Coldwater Fork in Martin County, at a total depth of 1,241 feet. Production data is still unavailable as testing for oil in Maxon sand had not been concluded.

The Inland Gas Corp. made location for No. 208 Lenzie Amburgy on Carr's Fork of Troublesome Creek in Knott County. The same company also made location for No. 209 Joseph Piggman, on Troublesome Creek, in Knott County.

The Kentucky West Virginia Gas Co. will drill No. 5252 on the Clery Taylor land on Linbark Fork of Coldwater Fork in Martin County.

In Floyd County, the Kentucky West Virginia Gas Co. is rigging up No. 566 Samuel Dillon, on Ivy Creek, and was drilling at 971 feet, in sand, in No. 5250 on the William Crider land on Johns Creek.

In Knott County, the Inland Gas Corp. was drilling at 1,547 feet in No. 207 Curtis Pigman, and is testing in Maxon sand at 1,671 feet in No. 206 on the Zada Hutcherson land. Both wells are on the Right Fork of Troublesome Creek.

In the Ida May district of Lee County, Petroleum Exploration is drilling at 250 feet in No. 23 Pryse Heirs, on Duck Fork. Heath & Co. is down 125 feet in No. 6 S. W. Steele, on Duck Fork, in the same district.

CENTRAL OHIO

NEWARK, Ohio, Mar. 27.—Noble County took the spotlight in the past week with a 3,500,000-cu. ft. gasser from the Berea sand. Yoker Valley Oil & Gas Co. drilled the well in Beaver Township, on the Harvey Long farm in Section 33. The sand was found at 1,412-28 feet.

Fairfield County, Berne Township, City Natural Gas Works No. 2 Mary Bowman, Section 34, was drilled through the Clinton sand for a dry hole; total depth 2,187 feet.

Guernsey County, Millwood Township, Ohio Fuel Gas Co. No. 1 Viola Romans, Section 8, had only a small showing of gas in the Berea sand at 1,411-19 feet and was abandoned at 1,426 feet.

Boston & Cosgrove found the Clinton sand missing and abandoned their wildcat on the C. L. Kramer farm in Huron County, Hartland County, Lot 2, Section 3, total depth 2,026 feet.

Licking County, Eden Township, Taylor Bishop and others No. 1 John Baker, Section 9, is a small gas well in the Berea at 788-99 feet. In Mary Ann Township, George Vandergrift and others No. 2 William A. Connor, fourth quarter, made 9 bbls. of oil the first 24 hours after a shot in the Berea sand at 788-801 feet. Hoover Brothers No. 3 Homer Wells, Lot 23, first quarter, was completed as a small Berea sand gas well at 758 feet. In Perry Township, Hope Construction & Refining Co. No. 1 Elbert Ashcraft, Section 23, is a Clinton sand oil well, making 23 bbls. the first 24 hours after a shot in sand at 2,773-2,826 feet.

Lorain County, Pittsfield Township, Ohio Fuel Gas Co. No. 1 G. A. Arnold, Lot 140, is a gas well in the Clinton sand, with an open flow of 525,000 cu ft.; total depth 2,295 feet.

Meigs County, Salisbury Township, Ohio Fuel Gas Co. No. 2 D. H. Russell, Section 33, is good for 500,000 cu. ft. open flow of gas from the Salt sand at 784-98 feet.

Lima Field

The Davidson Co. found the Trenton dry in a test on the William Daugh farm in Section 12, Bath Township, Allen County. The top of the Trenton was at 1,332 feet; hole abandoned at 1,373 feet.

The Goodwill Oil & Gas Co., in Portage Township, Wood County, has been successful in shutting off the water in the Lucy Damon test and is deepening from 1,887 feet.

J. L. Harper No. 1 Thomas Tira, northern part of Franklin Township, Adams County, drilling at 810 feet.

Brown County, Perry Township, Col. J. P. Kappas and others No. 1 George Moore, encountered water at 1,380 feet and is now drilling below 1,420 feet. The top of the Trenton was found at 843 feet.

Preble County, Jackson Township, Benedum & Trees No. 1 John E. Morrow, Section 9, found the top of the Trenton at 1,137 feet; now drilling at 1,450 feet.

Southwest Texas District

By F. L. SINGLETON

Jim Wells County Has New High-Gravity Distillate Pool

CORPUS CHRISTI, Tex., Mar. 27.—Developments along the Frio-Vicksburg trend continued to hold the attention of operators in the Southwest Texas district as one new field was opened in Jim Wells County, and the Kelsey field in Jim Hogg and Brooks counties received a new sand discovery.

Magnolia Petroleum Co. No. 1 Sam Maun, located near the LaGloria townsite in the Los Olmos y Loma Blanco grant, southern Jim Wells County, was completed for an initial production of 105 bbls. of 60-gravity distillate per day, flowing through a five-sixteenths inch choke under a tubing pressure of 2,175 pounds and casing pressure 2,325 pounds. Completion was made through perforated casing at 6,560-70 feet. The hole was drilled to a total depth of 7,560 feet, and the present test was made after a previous attempt at 7,093-7,110 feet showed salt water.

The above field is located a few miles southwest of the recently opened Von Blucher field where Shell Petroleum Corp. has started drilling operations on its second test, No. 2 Von Blucher, located 1,865 feet due east of the discovery well in the Lucinda Best Survey. There are five active wildcats in the county and locations were made for two more the past week. Gravis & Doran rigged up No. 1 Lillian Muil in the J. Poitevent Survey, about 1 mile south of the same operator's No. 1 Frances Clark, recently completed for an initial production of 5 bbls. of distillate through a 7/64-inch choke with tubing pressure 540 pounds and casing pressure 1,750 pounds. Production was obtained by perforating casing at 4,805-14 feet. The latter well opens a new producing area 2½ miles southeast of the East Alice field. In this same area Tom Graham is moving in material for No. 1 Zappe in the Lavaca grant.

Production from a deeper sand in the Kelsey field in Jim Hogg and Brooks counties was apparently opened as Humble Oil & Refining Co. No. 5 McGill recovered 550 feet of pipe line oil and 75 pounds of working pressure on a 20-minute drill-stem test at 6,099-6,107 feet. The sand section is believed to be in the lower Vicksburg formation approximately 2,500 feet lower than the main producing horizon. At the close of the week the well was coring ahead below 6,110 feet. The well is located on the Brooks County side of the field about midway between No. 7 McGill and No. 6 McGill. The southern part of the field was further defined as the same company abandoned No. 6 McGill at a total depth of 4,785 feet. The well is about 2,000 feet due west of No. 3 McGill and approximately the same distance southeast of No. 8 Bass in Jim Hogg County.

Tomoconnor Outpost Showing

Northeast of the Tomoconnor field, Refugio County, Windsor Oil Co. cemented 5½-inch casing in No. 1 J. E. Power at 6,035 feet, the total depth, preparatory to testing a sand section at 5,935-47 feet which is reported to have shown up favorably on an electrical survey. The well is located in the Gideon Walker Survey, about 3,500 feet northeast of production.

The Weser area in Goliad County received another distillate producer while material was being moved in for another test. Martex Oil Co. No. 1 W. M. F. Albrecht, Thomas Hancock Survey, was completed through perforated casing at 5,232-40 feet, and is flowing one-half barrel of distillate per hour through a three-eighths inch choke. Tubing pressure is 1,560 pounds and casing pressure 1,650 pounds. The new location was made by H. J. DeArman and others for No. 2 O. G. Drier in the B.S.&F. Survey No. 7, about 300 feet north of No. 1, an abandoned hole which showed considerable gas.

Along the same trend and located in Bee County, locations were made for two important wildcats. Northeast of Skidmore and in the Michael Fox Survey, Humble Oil & Refining Co. staked location for No. 1 Fox, while southeast of the town of Pettus and in the L. C. Randolph Survey, Magnolia Petroleum Co. is moving in material for No. 1 McKinney.

In the South Clara Driscoll field, Nueces County, Wellington Oil Co. No. 1 Richardson was holding attention, as 5½-inch casing was cemented at 7,520 feet, after an electrical survey was made to the total depth of 7,560 feet. While the results of the survey were not available, it is generally believed that the casing was cemented to test a deeper sand in view of the fact that present development is confined to the 5,600-foot horizon.

The East White Point field, San Patricio County, was being extended a short distance as Nueces Royalty Co. No. 1 Green in the West subdivision in Section 50, cored oil sand at 5,588-5,607 feet and at 5,616-28 feet. The hole is bottomed at 5,632 feet, and casing was cemented for completion. Shell Petroleum Corp. No. 5 Kirk, topped oil sand at 5,614-64 feet, total depth, and casing was cemented on top of the sand at 5,614 feet. The two wells are reported to have encountered the sand considerably higher than the other producers.

Northeast of the Sweden field, Duval County, Gravis & Doran abandoned No. 1 Atlee Parr after it showed salt water on a production test in the 5,800-foot horizon. The hole is bottomed in the Cockfield formation at 6,281 feet. The rig is being moved approximately 1½ miles southeast of the Longhorn field for No. 1 Atlee Parr, Block 2, of the San Andres grant.

In the same county and located in the Fitzsimmons field, H. J. Porter No. 1 Mew marked up a 2,000-foot southwest extension, as a 10-minute drill-stem test at 4,273-85 feet tested 1,080 feet of pipe line oil and 140 pounds of pressure. The Pettus sand was cored at 4,279-85 feet, the total depth, and casing was cemented on bottom. The well is located in Survey No. 285.

Along the shallow Laredo-Pettus trend and located north of the Laurel field in Webb County, Smith & Storey and others No. 1 Houston Oil Co. is swabbing through perforated casing at 1,834-65 feet. Casing was cemented for testing after a drill-stem test showed a slight amount of oil and mud. The well is located in Section 24, about 1 mile north of production.

SOUTHWEST TEXAS COMPLETIONS IN PROVEN FIELDS

Aransas-San Patricio Counties

McCampbell field: Corgey & Grote No. 1 McCampbell-Porterfield 7,180 feet, abandoned. Corgey & Grote No. 1 Miller, 7,150 feet, 190 bbls., three-sixteenths inch choke. Corgey & Grote No. 2 Peoples Estate 7,150 feet, 180 bbls., three-sixteenths inch choke. Graham Oil Co. No. 2 Hoffman, perforated casing 7,118½-23½ feet, 195 bbls., three-sixteenths inch choke.

Bastrop County

Yoast field: Pulliam & McCarty No. 2 Yoast, 1,580 feet, abandoned.

Caldwell County

Branyon field: Fred Adams No. 1 Teas, 2,376 feet, abandoned. Coffield & Robinson No. 11 Young, 2,207 feet, 25 bbls. oil, 25 bbls. water, pumping. Elmag Oil Corp. No. 4 Dickerson, 2,270 feet, 160 bbls., one-sixteenth inch and one-eighth inch casing choke. Martel Petroleum Co. No. 4 Carter 2,671 feet, 70 bbls. oil, 70 bbls. water, pumping.

Calhoun County

Heyser field: Humble Oil & Refining Co. and others No. 27-A P. H. Welder, 5,495 feet, 192 bbls., three-sixteenths inch choke.

Duval County

Cedro Hill field: Magnolia Petroleum Co. No. 3 Duval County Ranch Co., perforated casing 1,450-52½ feet, 25 bbls., pumping. Hoffman field: Continental Oil Co. No. 6 Collings, perforated casing, 2,706-13 feet, 129 bbls., 12 hours, quarter-inch choke. Longhorn field: Longhorn Drilling Co. No. 4 Miller, 4,902 feet, 190 bbls., 5/32-inch choke. M. Miller No. 2 fee, sand 4,899-4,905 feet, 103 bbls., 5/32-inch choke. M. M. Miller and others No. 3 fee, perforated casing 4,022-40 feet, 379 bbls., quarter-inch choke. Lundell field: Humble Oil & Refining Co. No. 14 White, sand 1,413½-18 feet, 17 bbls., three hours, pumping. Piedra De-Lumbre field: Dutex Petroleum Co. No. 4 State, sand 2,039-56 feet, 231 bbls., half-inch choke. Dutex Petroleum Co. No. 5 State, perforated casing 2,043½-55 feet, 230 bbls., half-inch choke.

Jim Hogg County

Kelsey field: Humble Oil & Refining Co. No. 7 Bass sand, 4,720-34 feet, 120 bbls., three-sixteenths inch choke. Humble Oil & Refining Co. No. 8 Bass, 4.733 feet, 43 bbls., one-eighth inch choke.

Jim Wells County

South Alice field: Tom Graham No. 1-G Bankers Mortgage, perforated casing 5,342-47 feet, 90 bbls., 3/32-inch choke.

Nueces County

Agua Dulce field: Gordon Shelton and others No. 2 Schultz, 6,042 feet, abandoned. Luby field: McAlester Fuel Oil Co. No. 1 State, perforated casing 5,039-43 feet, 129 bbls., one-eighth inch choke. Clara Driscoll field: O. W. Killam No. 1 Lee, perforated casing 5,660-68 feet, 125 bbls., one-eighth inch choke. Saxet field: Texon Royalty Co. No. 3-A Page, perforated casing 3,912-22 feet, gas well.

Refugio County

La Rosa field: Coronado Corp. No. 5 Michna, perforated casing 6,320-23 feet, 162 bbls., one-eighth inch choke. Coronado Corp. No. 9 Rooke, perforated casing 6,323-25 feet, 158 bbls., one-eighth inch choke. Coronado Corp. No. 12 Rooke, perforated casing 5,902-05 feet, 157 bbls., one-eighth inch choke. Refugio field: Houston Oil Co. No. 61 Rooke, perforated casing 6,206-18 feet, 157 bbls., one-eighth inch choke. Tomoconnor field: Quintana Petroleum Corp. No. 32 Heard, perforated casing 5,888-94 feet, 812 bbls., quarter-inch choke. Quintana Petroleum Corp. No. 79-A O'Connor, perforated casing 5,858-5,905 feet, 380 bbls., quarter-inch choke. Quintana Petroleum Corp. No. 5 Williams perforated casing 5,782-5,820 feet, 695 bbls., quarter-inch choke.

San Patricio County

East White Point field: Humble Oil & Refining Co. No. 3 Spear, 5,675 feet, 101 bbls., one-eighth inch choke. Plymouth Oil Co. No. 1-A Bailey, perforated casing 5,636-43 feet, 141 bbls., 7/64-inch choke. Plymouth Oil Co. No. 4 Ficke perforated casing 5,613-20 feet, 120 bbls., 7/64-inch choke.

Victoria County

McFaddin field: Barnsdall Oil Co. No. 21 McFaddin, 4,403 feet, 173 bbls., 9/64-inch choke.

Zapata County

Comitas field: Nordan & Morris No. 10-C Haynes, sand 1,227-45 feet, 68 bbls. pumping.

Texas and Louisiana Gulf

By
NEIL WILLIAMS

New Gas Area in Matagorda County; Tepetate Extended

HOUSTON, Tex., Mar. 27.—Wynn Crosby Drilling Co. No. 1 George S. Wilson, a wildcat 4½ miles south of Algoa, Brazoria County, was holding the attention of operators along the Texas Gulf Coast district as it cores ahead in the basal Frio formation below 9,120 feet, after logging sand with a gas and distillate odor in the upper Frio section. Three feet of soft ashy sand was recovered in a core at 8,839-49 feet, and broken sections of sand and sandy shale with a gas odor were cored at intervals to 8,883 feet. An electrical survey was made at 9,012 feet, the contract depth. Drilling is expected to continue to 10,000 feet and unless another sand is found the 8,800-foot sand is expected to be drill-stem tested. The well is located in the A. G. Reynolds Survey, about 2½ miles south of Beaty & Bowles and Borsodi No. 1 Frank Truska which was abandoned in 1937 at a total depth of 10,082 feet.

Sun Oil Co. No. 1 Cavallin opened a gas field west of the town of Palacios in Matagorda County as it is flowing gas, mud and salt water through an eighth-inch choke under a tubing pressure of 2,220 pounds and shut-in casing pressure 1,950 pounds. The hole is bottomed at 9,582 feet and the well was completed through perforated casing at 9,300-18 feet. Location is in Section 13, John Duncan Survey.

The West Ranch field, Jackson County, was extended 1,300 feet west with the completion of Magnolia Petroleum Co. No. 9-A West which flowed 298 bbls. daily through a three-sixteenths inch choke under a tubing pressure of 576 pounds and casing pressure 600 pounds. The hole is bottomed at 5,131 feet with 7-inch casing cemented at 5,121 feet. The rig is being moved 1,320 feet further west for No. 10-A West in the R. Musquiz Survey.

In the Winnie area, Jefferson County, Navarro Oil Co. and others No. 1 T. F. Koch, F. Lopez Survey, is scheduled to be abandoned after salt water sand was cored in the Frio formation topped at 8,547 feet, and cored to a depth of 8,661 feet, where the drill-stem was twisted off. Two miles east of China in the James Gerish Survey, Hebert & Smith were scheduled to start drilling operations on No. 1 Stella Turner, a 7,500-foot Frio test.

Shell Petroleum Corp. No. 1 Steinhagen, Lovells Lake field, Jefferson County, is shut in after it flowed distillate under extremely high gas pressure. The well is southeast of Humble Oil & Refining Co. No. 1 Todd and was tested through perforated casing in the 7,700-foot sand. To the north, Humble Oil & Refining Co. was preparing to test No. 3 Jefferson Land Co. and No. 1 Pitre both wells being bottomed at 7,724 feet.

Oil in Goodykoontz Area

Union Producing Co. No. 1 Murphy opened the first oil production in the Goodykoontz area, Harris County, when it flowed 88 bbls. daily through an eighth-inch choke with tubing pressure 490 pounds and casing pressure 1,480 pounds. Production was obtained by perforating casing in a new horizon at 7,020-30 feet. In the same county and located in the Eureka field, Tide Water Associated Oil Co. No. 1 Max Roy defined the southwest limits of the field when it was abandoned at a total depth of 8,090 feet.

In the Bammel field, Harris County, H. M. Harrel and others No. 1-A John Ehrhardt, northwest of production in the George Delesdenier Survey, was abandoned at 6,956 feet. On the south edge of the field, in the W.C. R.R. Survey, Hamill & Smith spudded No. 1 Sweeney. In the southern part of the county, and located in the Clear Lake field, Humble Oil & Refining Co. No. 6-C West topped gas sand at 5,751 feet, oil sand at 5,868 feet, and the well is being tested at a total depth of 5,913 feet.

Production tests were being made on two wells in the League City field, Galveston County. Midstates Oil Co. No. 2 Maco Stewart was drilled to a total depth of 10,337 feet and 7-inch casing was cemented at 9,146 feet. Sand showing oil was logged at intervals at 8,900-9,000 feet, and all sands cored below this horizon carried salt water. Northwest of the discovery well, Phillips Petroleum Co. No. 1 Stewart Title Guaranty Co. is bottomed at 10,400 feet and 7-inch casing was cemented at 10,398 feet. This well will test a new sand logged last week at 10,313-22 feet. Same company No. 1 J. C. Ott, perforated casing at 9,110-15 feet, and is flowing at the rate of 7 bbls. per hour through an eighth-inch choke with tubing pressure 3,125 pounds and casing pressure 3,500 pounds.

Louisiana Fields

Along the Louisiana coast, Vendome Petroleum Corp. was preparing to test No. 1 Kenilworth Plantation, which is expected to open the first production in St. Bernard Parish. This well was drilled to a total depth of 11,469 feet and 7-inch casing was cemented on bottom. Casing will be perforated at 11,200-20 feet, opposite oil sand which showed 8 ohms resistivity on an electrical survey. Other favorable sands logged by electrical surveys include a 32-foot section at 10,532-64 feet; a 64-foot section at 10,597-10,661 feet and a 65-foot section at 10,895-10,960 feet. The well is east of the Mississippi River in Section 59-13s-14e.

Locations for two wildcats in Cameron and Calcasieu parishes were announced by Union Sulphur Co. In Cameron Parish, No. 1 Sweet Lake Land & Oil Co. is 330 feet south and east of the northwest corner of Section 9-12s-7w, about 6 miles north of the Sweet Lake field, on a block of 6,000 acres which was worked extensively with geophysical instruments. In Calcasieu Parish, location was made for No. 1 B. Ulrich, 1,000 feet north and 660 feet west of the southeast corner of Section 19-9s-10w, due north of the Sulphur field.

In the Chalkley field, Cameron Parish, Humble Oil & Refining Co. No. 2 Cameron Parish School Board showed salt water with a slight trace of oil when tested through perforated casing at 8,846-50 feet and the perforations have been squeezed off preparatory to retesting in another sand slightly above the present depth. Location was made by Shell Petroleum Corp. for No. 1-A Katherine Bel, southeast of the above test in Section 15-12s-6w.

In the South Roanoke field, Jefferson Davis Parish, Continental Oil Co. cemented 8⅝-inch casing in No. 2 Joe Sturdivant at 9,825 feet, and the hole is being drilled ahead. The well is in Section 36-10s-4w, a quarter-mile south of production. In the same parish and in the Woodlawn field, Union Sulphur Co. perforated casing in No. 4 Calcasieu National Bank at 8,867-73 feet and the well was being washed in.

Tepetate Extended

The North Tepetate field, Acadia Parish, was extended a quarter mile north with the completion of Atlantic Refining Co. No. 4 Klumpp which flowed 52 bbls. of distillate per day through a three-sixteenths inch choke from a total depth of 8,561 feet.

On the LaPice prospect, St. James Parish, Shell Petroleum Corp. No. 1 Shexnayder, Section 39-14s-15e, is coring sand with a gas odor below 10,754 feet. The well attempted to blow out but was brought under control within a few hours. Several sands showing oil and gas have been logged and drill-stem testing has shown favorable indications.

In the Dulac field, Terrebonne Parish, Fohs Oil Co. has let contract for a 12,000-foot test to be drilled on the C. W. Buckley and A. Mehler lease in Section 77-19s-17e, approximately 1 mile northwest of the company's No. 1 Buckley & Bourg which was completed last year at 13,254-66 feet as the world's deepest producer.

TEXAS GULF COAST COMPLETIONS IN PROVEN FIELDS

Brazoria County

Hastings field: Humble Oil & Refining Co. No. 1 Lerew, 6,080 feet, 456 bbls., quarter-inch choke. Stanolind Oil & Gas Co. No. 1 fee, perforated casing 6,052-78 feet, 615 bbls., quarter-inch choke.

Fort Bend County

Mackhank Oil Co. No. 11-C Farmer, 6,281 feet, abandoned.

Galveston County

Dickinson field: Bennett Oil Corp. No. 1 A. Thayer, sand 8,725-97 feet, 317 bbls., quarter-inch choke. Humble Oil & Refining Co. No. 26-A Maco Stewart, 8,526 feet, 120 bbls., quarter-inch choke.

Hardin County

Batson field: Seaport Oil Co. No. 1 Jordan, perforated casing 5,524-49 feet, 481 bbls., quarter-inch choke.

Harris County

Bammel field: H. M. Harrell and others No. 1-A Ehrhardt, 6,956 feet, abandoned. Eureka field: Tide Water Associated Oil Co. No. 2 Roy, 9,090 feet, abandoned. Fairbanks field: Amerada-Stanolind Oil & Gas Co. No. 2 Adell, perforated casing 6,833-45 feet, 174 bbls., eighth-inch choke. Amerada-Stanolind Oil & Gas Co. No. 10 E. W. Mills, perforated casing 6,850-53½ feet, 180 bbls., eighth-inch choke. Amerada-Stanolind Oil & Gas Co. No. 4 R. C. Smith, perforated casing 6,846½-50½ feet, 120 bbls., eighth-inch choke. Amerada-Stanolind Oil & Gas Co. No. 5 E. M. White, perforated casing 6,844-47 feet, 146 bbls., eighth-inch choke. H. B. Ownby Drilling Co. No. 3 White, sand 6,824-48 feet, 154 bbls., eighth-inch choke. Union Producing Co. No. 1 Murphy, perforated casing 7,020-30 feet, 100 bbls., eighth-inch choke. Friendswood field: Humble Oil & Refining Co. No. 10-B Humble-West, sand 5,462-6,048 feet, 578 bbls., quarter-inch choke. Humble Oil & Refining Co. No. 13 Keisling-Dixon, sand 5,576-6,040 feet, 609 bbls., quarter-inch choke. Humble Oil & Refining Co. No. 9 West Production Co., sand 5,410-6,042 feet, 552 bbls., quarter-inch choke. Tomball field: Humble Oil & Refining Co. No. 3-B Schultz, 5,592 feet, 480 bbls., three-sixteenths inch choke.

Jefferson County

Amelia field: Humble Oil & Refining Co. No. 1 Pinchback-Harrison, 6,775 feet, 143 bbls., eighth-inch choke.

Liberty County

Esperson field: General Crude Oil Co. No. 1 Pearl Burgess, 8,215 feet, abandoned.

Matagorda County

Van Vleck field: Skelly Oil Co. No. 5 Moore Estate, sand 8,207-49 feet, 139 bbls., eighth-inch choke.

Orange County

Orange field: C. L. Brown No. 3-B Chesson, sand 5,582-96 feet, 110 bbls., eighth-inch choke. Gulf Oil Corp. No. 2-B LaFlour and others, 5,800 feet, 148 bbls., eighth-inch choke. Red Banks Oil Co. No. 1 Chesson, 5,982 feet, 123 bbls., eighth-inch choke.

Waller County

Katy field: Stanolind Oil & Gas Co. No. 1 McCarty-Williamson, 7,300 feet, gas well. Withers field: Texas Co. No. 2-B Thompson, 5,547 feet, 57 bbls., eighth-inch choke.

Good Packing Stops many a Leak

IN THE PROFIT LEDGER

A few of the services for which there is a special Severe Service Packing

Steam, water, air, ammonia, propane, butane, gasoline, sulphuric acid, cresylic acid, wax distillate, crude oil reflux, phenol, carbon dioxide, salt water, distillate.

FOR any oil country service, there is a specially designed Severe Service packing that will do the job better.

Field tested by experienced operating men who understand the packing problems of the oil country, this packing is backed by the reputation of satisfactory service. Years of manufacturing experience, constant improvement of design and careful selection of materials are combined to provide the operator with a durable, profit-saving product.

Let your Continental representative help you solve your next packing problem. He has a specific packing in the Severe Service line for your individual requirement.

THE CONTINENTAL SUPPLY COMPANY

General Offices: DALLAS, TEXAS

Export Office: CONTINENTAL EMSCO CO., Inc.
30 Rockefeller Plaza New York City, N. Y.

Representatives:
LONDON BUENOS AIRES MARACAIBO TRINIDAD TAMPICO

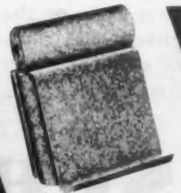
CONTINENTAL

"Serving the Oil and Gas Industries"

Hydraulic Packing—Regular or Rock Hard

High Pressure Asbestos Packing

Asbestos Man-hole and Hand-hole Gaskets



Compressed Asbestos Sheet Packing

Square Braided Propane and Butane Packing

West Texas Fields

(Continued from Page 188)

weeks may see the complete linking of the Lewis pool and the Steffens pool in southeastern Jones County. Another large natural producer was completed in the eastern portion of the Lewis pool, Fain-McGaha Oil Corp. No. 4 Shaheen, and location was staked for No. 5 Shaheen. The new completion, in the southwestern quarter of Section 36, Block 15, T.&P. Survey, drilled 22 feet of saturation from 1,873-95 feet. This completion, together with the development by Ungren & Frazier on the Brock lease just to the north, brings production in the Lewis pool to within a half mile of the southern end of production in the Steffens pool. Both areas are producing from the 1,875-foot horizon and the definite linking of the pools would prove considerable flank acreage for production.

Stephens County

Initial acid treatment of Lone Star Gas Co. No. 1-A McKee, Ellenburger lime discovery in southwestern Stephens County's Lake sand pool, resulted in its making an estimated flow of 500 to 600 bbls. daily. Operators ran casing to top of saturation at 4,107 feet after the hole filled 1,300 feet in three hours and it had been treated with 1,000 gallons of acid. Total depth is 4,114 feet. Location is in the northwest corner of Section 39, Block 7, T.&P. Survey, and is a south offset to Willard Rich No. 1 Andrews, discovery well of last summer in the Lake sand. The Lone Star test failed to find the Lake horizon.

WEST TEXAS COMPLETIONS

(24-hour gauges)

Ector County

Atlantic Refining Co. No. 1-D J. L. Johnson, 4,085-4,225 feet, 395 bbls. Atlantic & Skelly No. 5-C University, 3,350-3,642 feet, 1,558 bbls. Broderick & Calvert No. 3 O. B. Holt, 4,200-4,424 feet, 2,719 bbls. Cities Service Oil Co. No. 1 W. H. Rhodes, 4,075-4,200 feet, 450 bbls. Sinclair Prairie Oil Co. No. 1 Fay Holt, 4,160-4,305 feet, 561 bbls. Stanolind Oil & Gas Co. No. 8 Johnson, 4,120-4,219 feet, 295 bbls. L. H. Wentz No. 10 Moss, 4,014-4,122 feet, 618 bbls.

Andrews County

Gulf Oil Corp. No. 1-A W. T. Ford, 4,340-4,460 feet, 147 bbls. Humble Oil & Refining Co. No. 57 J. S. Means, 4,500-25 feet, 3,323 bbls.

Crane County

Gulf Oil Corp. No. 57 McElroy, 2,814-2,980 feet, 156 bbls.; old well drilled deeper. Gulf Oil Corp. No. 60 McElroy, 2,800-3,005 feet, 280 bbls.; old well drilled deeper.

Howard County

F. W. Merrick No. 6-B Chalk, 2,843-2,944 feet, 1,522 bbls. T. G. Shaw No. 1 H. N. Wilkerson, dry and abandoned at 3,787 feet.

Pecos County

George T. Abell No. 1 W. Williams, dry and abandoned at 2,464 feet. British-American Oil Co. No. 12 Payton, 1,896-2,095 feet, 76 bbls. British-American Oil Co. No. 14 Payton, 1,902-2,079 feet, 76 bbls. Childress Royalty Co. No. 3 W. T. Shearer, 1,480-99 feet, 335 bbls. Kone Production Co. No. 9 Pecos Valley, 1,533-1,600 feet, 371 bbls. Mid-Continent Petroleum Corp. No. 4 Jasper City Royalty, 1,666-87 feet, 126 bbls. Samwan Oil Co. No. 1-A Masterson, 1,472-93 feet, 116 bbls. W. H. Street No. 7 Shearer-Texas Co., 1,475-91 feet, 263 bbls. Wesley Oil & Gas Co. No. 4 Francis-Lewis, 1,788-1,841 feet, 626 bbls.

Stonewall County

W. I. Southern, Inc., No. 2 Carlisle, 5,147-5,152 feet, 248 bbls.

Upton County

Gulf Oil Corp. No. 36 Crier-McElroy, 2,776-2,936 feet, 2,203 bbls. Gulf Oil Corp. No. 189 McElroy, 2,821-3,035 feet, 370 bbls. Humble Oil & Refining Co. No. 30-B Ricker, 2,357-2,440 feet, 383 bbls. A. J. Rife No. 6 Baker-Republic, 2,175-2,247 feet, 1,037 bbls. Harvey-Sergeant & Rutter No. 3 Cordova-Union, 2,250-2,350 feet, 998 bbls.

Ward County

Magnolia Petroleum Co. No. 1-45 Sealy, 2,775-2,831 feet, 281 bbls. Roeser & Pendleton No. 1-8 Johnson, 2,023-93 feet, 132 bbls.

Winkler County

Atlantic & Maxwell No. 4 Daugherty, 2,780-3,060 feet, 45 bbls.; old well drilled deeper. Magnolia Petroleum Co. No. 222 Walton, 3,165-3,259 feet, 211 bbls. S. W. Richardson No. 6 Continental-Jenkins, 3,346-97 feet, 347 bbls. Richardson Oil, Inc., No. 8-F Scarborough, 2,846-2,968 feet, 94 bbls. J. R. Sharp No. 3 Walton-Cities Service, 3,345-90 feet, 445 bbls.

Yoakum County

Devonian Oil Co. No. 3 Hodges, 4,995-5,224 feet, 2,654 bbls. Aloco Oil Co. No. 1 Pearl Chatterton, 5,016-5,160 feet, 1,253 bbls. Honolulu Oil Corp. No. 3 Kendrick, location temporarily abandoned. Skelly Oil Co. No. 1 Kendrick, 4,840-5,140 feet, 1,592 bbls.; old well drilled deeper. Toddie L. Wynne, trustee, No. 3 C. A. Thomas, 5,016-5,146 feet, 1,296 bbls.

WEST CENTRAL TEXAS COMPLETIONS

(24-hour gauges)

Brown County

Hodges No. 1 Henshaw, dry and abandoned at 2,126 feet.

Callahan County

Warren-Kleiner No. 5-A Clark, 749-58 feet, 30 bbls.

Coleman County

Anzac Oil Corp. No. 3-J Morris Estate, 1,985-2,000 feet, 96 bbls. Kyneston & Boxman No. 1 McCord, dry and abandoned at 3,520 feet. Lamb & Kirkpatrick No. 1 T. J. Noxon, dry and abandoned at 3,027 feet.

Comanche County

Taylor & Eakin No. 1 Bettis, dry and abandoned at 650 feet.

Jones County

Gillispie-Fain-McGaha No. 1 McKeever, dry and

P&H EXCAVATORS

FAST TO THE JOB—FAST THRU!

... a hundred feet or a hundred miles to the job, you want a machine that's fast-moving — that saves time on the job — and between jobs. These P&H Pacemakers are all of that — fast on their own tractor-type crawlers, truck mounting, or on the special highway trailer that permits you to tow them at normal motor car speeds! As for digging, you never saw snappier action! That's because they're *modern* — built of tough alloy rolled steels, stronger, lighter, easier to operate.

CONVERT FOR 7 TYPES OF WORK

Simple attachments (also of alloy rolled steels) make it practical to change over right on the job for service as shovel, dragline, crane, clamshell, trench-hoe, pile driver or skimmer. Why not get all the reasons why these machines are so popular in the oil fields?

In requesting literature, state type and capacity of machine in which you are interested. Address the Harnischfeger Corporation, 4527 W. National Ave., Milwaukee, Wis.

HARNISCHFEGER
CORPORATION
EXCAVATORS • ELECTRIC CRANES • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

abandoned at 2,351 feet. Gregg Oil Co. No. 1 E. D. Appling, 2,631-38 feet, 412 bbls. W. H. Peckham No. 1 B. C. Humphrey, 3,260-78 feet, 298 bbls. Roberts Co. No. 1 Collier, dry and abandoned at 2,280 feet. Ungren & Frazier No. 1 Brock, 1,888-1,906 feet, 202 bbls. Ungren & Frazier No. 2 Griffin, 3,258-68 feet, 503 bbls.

Taylor County

Tal-Vez Oil Co. No. 1 D. T. Hooper, 2,244-92 feet, 3,250,000 cu. ft. of gas.

Shackelford County

Charter Oil & Gas Co. No. 1 W. P. Newell, dry and abandoned at 1,804 feet. J. O. Fox & Son No. 4 Nail Estate, dry and abandoned at 1,616 feet. Lee & Key No. 14 Diller Brothers, 518-28 feet, 12 bbls. Tylor and others No. 1 Nail Estate, dry and abandoned at 1,552 feet. Thomas Wittmer No. 2-A Lones Estate, dry and abandoned at 712 feet.

PANHANDLE FIELD COMPLETIONS

(24-hour gauges)

Moore County

Texoma Natural Gas Co. No. 17 J. T. Sneed, 2,307-2,987 feet, 13,178,000 cu. ft. of gas.

Carson County

Continental Oil Co. No. 5 F. Black, 3,025-3,169 feet, 280 bbls. Skelly Oil Co. No. 90 Schafer Ranch, 3,005-70 feet, 599 bbls. Texoma Natural Gas Co. No. 1 L. A. Abersold, 2,552-2,677 feet, 17,588,000 cu. ft. of gas. Texoma Natural Gas Co. No. 2-G A. J. Dauer, 2,290-2,400 feet, 44,459,000 cu. ft. of gas.

Gray County

Continental Oil Co. No. 3 M. K. Brown, 3,200-90 feet, 585 bbls. Danciger Oil & Refining Co. No. 18 Powell-Beck, 2,866-2,947 feet, 57 bbls. Magnolia Petroleum Co. No. 27 fee No. 227, 2,804-2,895 feet, 106 bbls.

Hutchinson County

Phillips Petroleum Co. No. 20 J. J. Perkins, 2,918-53 feet, 133 bbls. Cy Reiger No. 5 J. T. Hodges, 3,025-76 feet, 248 bbls.

North Louisiana, Arkansas

By GEORGE WEBER

Mississippi-Alabama Sector Making Ready for Activity

SHREVEPORT, La., Mar. 25.—Routine field development marked the week's activity in the Tex-La-Ark district, with little of importance in regard to new discoveries or exploration. The Shreveport field, currently the most active drilling spot in this area, added several new operations, and now has 15 rotaries drilling or moving in to start operations. A small producer is expected in Natchitoches Parish, where a wildcat is awaiting pump for completion.

Mississippi-Alabama Activity

Leasing and geological surveying are increasing in Mississippi and Alabama, pointing to the beginning of expected drilling campaigns within the next few months. In Mississippi the eastward trend of the Sparta-Wilcox play may bring to that state its first oil development. Alabama activity consists of considerable interest in the northwest section of the state, where another basin play seems in the offing.

Shreveport Field

With increasing drilling, the Shreveport field is the brightest drilling spot in the district. The outpost and edge developments of the past several weeks have brought into the proven limits of the pool, much additional acreage, and the current drilling program consists mainly in development of those inside locations. Two wells tested the Pettit lime formation this week, one of which, Harry Fotiades No. 1 Tomlinson, located on the northeast edge, was brought in for an initial production gauge of 648 bbls. per day through a 28/64-inch choke. The William C. Leisk No. 1 Sinclair, shut in last week after showing salt water, was given a flowing test this week, making 28 bbls. of oil and 15 bbls. of salt water hourly. It is being plugged back in an attempt to shut off the salt water.

In the Marion County section of Rodessa, Harry Hanbury completed No. 2 Davis, William Meyers Survey, for an initial of 798 bbls. daily through a quarter-inch choke, with tubing pressure of 500 pounds and casing pressure of 750 pounds. Drilling activity in Rodessa has dwindled considerably during the past several weeks, until only four rigs are actively drilling in the tri-state field.

The Sligo field of Bossier Parish failed to get an expected 1-mile westward extension in the 3,100-foot oil sand, when the Triangle Drilling Co. No. 1 Sandridge tested dry in the sand zone. The well, however, is being carried deeper, and late in the week was drilling below 3,825 feet in lime. The expected pay sand, at 3,220 feet, was acidized last week with 500 gallons, after which it showed oil, but not in sufficient quantities to warrant a production test.

In the Vivian field of Caddo Parish another producer was completed although general success in the shallow new production has been disappointing. The Tippett Drilling Co. No. 1 Stallcup gauged 14 bbls. per hour, flowing through a half-inch choke with 5½-inch casing set at 2,471 feet, and total depth 2,481 feet. In the same area, the operators' No. 1 Thigpen & Herold was abandoned at 2,500 feet after drilling through the sand found dry at 2,453-59 feet.

Production by Pools

Estimated daily gross production all companies week ending March 24, 1939:

NORTH LOUISIANA

	Bbls.
Bellevue	700
Caddo light	4,075
Caddo heavy	2,530
Converse	455
Cotton Valley heavy	95
Cotton Valley light	*12,975
Cross Lake	2,850
De Soto and Red River	1,125
Elm Grove	265
Haynesville	2,890
Holly	75
Homer	2,675
Lisbon	3,495
Pleasant Hill	105
Rodessa	28,530
Sarepta-Carterville	†380
Sligo	1,320
Sugar Creek	260
Urania	2,765
Zwolle	2,985
Total	70,550

SOUTH ARKANSAS

Buckner	1,480
Champagnolle	1,710
El Dorado	1,720
Lisbon	250
Magnolia	3,095
Miller County	350
Nevada	590
Rodessa	5,165
Schuler	18,835
Smackover light	1,905
Smackover heavy	14,760
Stephens	515
Troy	1,060
Urbana	1,165
Village	600
Total	53,200

Texas side of Rodessa field 30,310 bbls. daily.
*4,210 bbls. is distillate.
†145 bbls. is distillate.

Shongaloo Test

The Magnolia Petroleum Co. No. 1 Roseberry Unit, a deep test in the old shallow Shongaloo gas field of northern Webster Parish, has set 5½-inch casing in the Sexton sand, and the second deep gas-distillate producer for the field is expected next week. The No. 1 Roseberry topped the Sexton sand at 9,253 feet, finding streaks of sand at 9,145-81 feet, 9,253-55 feet, and 9,314-61 feet, all showing gas. The test is bottomed at 9,380 feet.

In the nearby Bellevue field, one of the older shallow pools of North Louisiana, a deep test is reported planned in the near future. The Bisteneau area of southern Bossier Parish, with one deep test, Arkansas Louisiana Gas Co. No. 1 Gayoso drilling below 7,000 feet, will shortly have another active test, with the spudding of the same operator's No. 1 Shehee, located two locations to the northeast of the active test.

Natchitoches Wildcat

To the south in Natchitoches Parish, the Jack Lent and others No. 1 Whatley, a wildcat located in the SW cor. Section 17-10-10, is awaiting a pumping unit for completion in the Paluxy or Fredericksburg sand at 3,300 feet. The operator last week ran a string of 2-inch tubing and liner, and the well tested oil and salt water, but would not flow.

Arkansas Activity

In South Arkansas, the current Smackover lime development continues to center in Columbia County, where 11 rigs are active in the Magnolia, Village, and Atlanta fields. One of the best producers yet completed in the Magnolia field, was gauged this week. Atlantic Refining Co. No. 1 A. S. Crisp flowed 108 bbls. hourly through a half-inch choke with tubing pressure of 1,300 pounds and casing pressure of 900 pounds. Saturated oolitic lime was encountered at 7,533-91 feet.

New York-Penna. Gas Fields

COUDERSPORT, Pa., Mar. 27.—The third successful completion in the new Sharon Township, Potter County, Pennsylvania, deep sand gas field was recorded during the past week when G. L. Cabot, Inc., drilled into the Oriskany on the Plank School farm and brought in a well with an initial open flow of 15,800,000 cu. ft. per day. This well, like the two previous producers, is north of the dry hole drilled by the Belmont Quadrangle Drilling Co. on the C. Kemp farm which is believed to have encountered a fault and was dry.

The Cabot well topped the Oriskany sand at 4,723 feet and got the first show of gas at 4,725 feet. The well was completed at a total depth of 4,735 feet with an initial rock pressure of 1,575 pounds. The elevation of this well is 1,896 feet. The top of the Tully was found at 4,149 feet and the Onondaga at 4,669 feet.

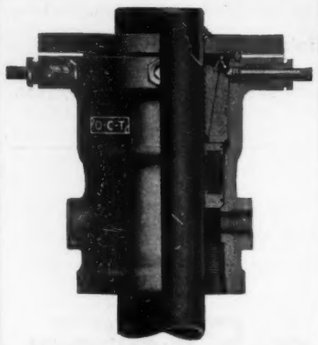
The Penn Bradford Oil Co. wildcat on Warrant 5574, Hamilton Township, McKean County, which drilled through the Oriskany sand without production, was abandoned at 4,145 feet. Bottom of the sand was at 4,143 feet.

Another Sharon well reached the Onondaga last week and is shut down for casing. This is the Empire Producing Co. well on the F. Dickerson farm which drilled through the Tully at 4,185-4,229 feet and reached the Onondaga at 4,709 feet. After drilling into the lime to 4,749 feet, drilling was suspended and preparations made to set casing.

In Bingham Township, Potter County, New York

(Continued on Page 211)

O-C-T
TYPE C-9-PS
SLIP SUSPENSION
CASING HEAD



Permits landing casing at any desired point. Permits drilling and running casing through blowout preventer equipment flanged above. Packing, slips, and slip bowl passes through blowout preventer to seat in body of head. Packing compressed by weight of casing. Hold-down screws aid in compressing packing. Available with or without welding flange, which holds casing down and effects auxiliary seal above slips. Test pressures up to 10,000 lbs.

OIL CENTER TOOL CO.
O-C-T
HOUSTON, TEXAS, U.S.A.
CABLE ADDRESS "OCENTOL"
"Sold Through Supply Stores"

A good well deserves the best pump

WHY IT PAYS TO BUY A PEERLESS

BECAUSE Peerless is one of the world's largest manufacturers of deep well turbine pumps.

BECAUSE Peerless laboratories have developed many exclusive improvements that result in high maintained efficiency.

BECAUSE Peerless uses the finest materials and precision manufacturing methods to give you a pump that will last many years longer than the average.

Factories:
LOS ANGELES, CALIF., SAN JOSE, CALIF.
FRESNO, CALIF. • MASSILLON, OHIO

★ WATER OR 1 OIL LUBRICATION
Peerless
TURBINE PUMPS
PERFORMANCE WITH ECONOMY
FOOD MACHINERY CORPORATION

Among the Drilling

COOPER DRILLING CO., Shawnee, at No. 1 Cosar, in SE NW SW of Section 12-6-5e, Grayson pool, Oklahoma, was drilling at 400 feet with 76 feet of 10-inch casing set.

AL J. WALKER, San Antonio, Tex., is preparing to start work on No. 1 Oscar M. Schmidt, SE SW of Section 13-3s-9w, Gibson County, Indiana. It will be a rotary test to the McClosky which is expected at around 2,000 feet. Gulf and Magnolia control considerable acreage in the area and are in on the deal.

CLINT CROSBY got 940 feet with the first bit run in his No. 1 Pauline Scherer in the NW SW of Section 13-7s-13w, Posey County, Indiana, 5 miles west of the Sun Oil Co. Posey field. Crosby holds a large block in the area although several major companies also have large spreads and are contributing. The Waltersburg is expected at 1,750 feet and the McClosky at 2,650 feet.

PAUL DORAN, Mattoon, Ill., was preparing to start work on three contracts in the Louden area. Fayette County, Illinois, for a major company. One rig will be used to drill the wells consecutively.

ED WRIGHT has a contract to drill a well on a structure mapped by John W. Merritt, consulting geologist of Tulsa, for Charles D. Delfeld and associates of Tulsa. He is rigging up to test in NW cor. Section 27-59-9w, Shelby County, Missouri. Tools were snaked to the location by caterpillar tractor owing to mud and soft ground.

J. W. OSBORN, Ada, Okla., has spudded in at the Hopper-Webb No. 1 Black, deep test. The test is located on the farm of Mrs. Alice Black, 12 miles southwest of Excelsior Springs, in Clay County, Missouri. Frank Hopper, Hutchinson, Kans., and W. E. Webb, Chicago, are financing the test which apparently will be the third to get under way in the Missouri section of the Forest City basin.

TABER & COLEMAN at No. 2 Miller, SW SE SE Section 29-7-5, Pottawatomie County, Oklahoma, was spudding. Same operators' No. 3 Miller, SE NW Section 29-7-5, set surface casing at 82 feet and were waiting for cement to set.

COOK DRILLING CO., Tyler, and John G. Mayo, Houston, Tex., have staked location for another Woodbine wildcat on their block in northern Houston County and southern Anderson County, East Central Texas. The test will be the operator's No. 1 Southern Pine Lumber Co., in the R. Erwin Survey, of southern Anderson County. The site is 30 feet out of the northwest corner of 422-acre tract, about 2 miles south of the old Camp Hill pool.

J. E. ELLIS, of Brownwood, Tex., has started a wildcat test in northeastern McCulloch County, West Texas, on lands of E. M. Coker, and others. Location is 150 feet from the north and 750 feet from the east line of the lease, the east 40 acres of a 140-acre tract in Section 2, Block 1, William Gann Survey. The test is 3 miles northeast of Placid. It will be carried to 1,000 feet unless production is obtained shallower.

BIG CHIEF DRILLING CO., at No. 1 Christian, SE NE NE of Section 3-14n-2e, Lincoln County, Oklahoma, was drilling below 3,393 feet.

ROWAN & HOPE are rigging up in Hidalgo County, Southwest Texas, for No. 1 Antonio Bazan, a wildcat in the San Ramon grant.

CRON & GRACEY completed Martex Oil Co. No. 1-A Albrecht in the Weser area, Goliad County, Texas. as a distillate producer. Production was obtained by perforating casing at 5,232-40 feet. The rig is being moved for No. 2 O. G. Drier which will be drilled jointly with H. J. DeArman and others.

HUGHES DRILLING CO. of Bristow, at No. 1 Meisner, in C NE NW of Section 10-20n-4w, in the Brown pool of southeastern Garfield County, Oklahoma, came in for a good producer when oil gushed over the derrick from a total depth of 5,921 feet in the second Wilcox sand, topped at 5,913 feet. The well made three head flows in 12 hours and was estimated good for 350 bbls. of oil daily. Salt water was encountered in the first Wilcox, topped at 5,825 feet, and 194 feet of 5⅞-inch line was set at 5,894 feet, shutting off the water. The well is now shut in for tankage.

HELMERICH & PAYNE, Tulsa, have given northern Archer County, North Texas, a new deep operation with the staking of their No. 1 J. N. Shepherd, 330 feet from the south and west lines of a 200-acre tract in the Abner Nails Survey, Abstract 325. Helmerich & Payne and United Petroleum Producers formerly jointly owned the 200 acres, however,

H. C. SMITH
ROCK BITS
INSURE INCREASED SPEED AND ECONOMY

H. C. SMITH ROCK BIT
available in sizes 5⅝" up to and including 13"

Send for Folder or see Composite Catalog

H C Smith Oil Tool Co.
GENERAL OFFICES AND PLANT
P. O. Box 431, Compton, Calif.

Export Office:
30 Rockefeller Plaza
New York City

NEW BEDFORD PURE MANILA

"There is no better rope"

Standco
NO-SMOKE
STANDCO BRAKE LINING
Nothing novel—no bunk—but it gets the job done without scoring brake rims. See page 2100, Composite Catalog.
STANDARD BRAKE LINING CO.

Contractors

the area has been equally divided and each company has staked a location on its 100 acres. The United Producers staked its No. 1 J. N. Shepherd in the same survey.

ALLEN & MORRIS are completing their No. 1 Cochran Sweet, adjoining the northwest city limits of Aransas Pass in the McCampbell field, San Patricio County, Texas, and have started another operation in the same field for Landrum Jones Oil Co. on the Conn Brown lease. In the Luby field, Nueces County, Seaboard Oil Co. No. 50 Luby has been spudded. Other operations are reported in the La Rosa field, Refugio County, where three rotaries are operating for Coronado Corp.

FRANK GRAVIS abandoned his No. 1 Parr, a wildcat northeast of the Sweden field, Duval County, Southwest Texas, and the rig is being moved southeast of the Longhorn field, Duval County, for No. 1 Atlee Parr, located in Block 2, San Andres grant. In the North Sweden field, contract was received from Saltmount Oil Co. for No. 7-A Vaello in the Benavides field.

OSAGE DRILLING CO. at No. 2 Jones, in Section 20, Block A7, of P.S.L. Survey, Pecos County, Texas, drilled to 2,095 feet and set 2,085 feet of 9⅝-inch casing.

TRINITY DRILLERS, Inc., received contract from Lewis Production Co. for No. 7 S. G. Drushell in the I.&G.N. Survey No. 10, in the Cordele field, Jackson County, Texas.

VIRGINIA DRILLING CO. and S. A. Murphy at No. 1 Schlochtermeyer, a wildcat, in the SE cor. NW of Section 7-21-11w, southwest of the Snider pool in Stafford County, Kansas, were drilling below 3,515 feet in the Arbuckle dolomite with only 70 feet of oil in the hole. Field reports stated no additional oil has come into the hole since the tools have penetrated below 3,470 feet, the old total depth. Prior to deepening the test swabbed about 2½ bbls. of oil an hour.

RICHARDS & HOLLOWAY, Tyler, Tex., operators and contractors, jointly with Tyler & Smith, are indicating a new Mexia fault line field for northern Henderson County, eastern Texas. The test is the operators' No. 1 Rowe & Baker, in the T. Childers Survey. Several heads have been made by the well and operators are attempting to establish a steady flow. Production is from the Woodbine sand from 3,137-44 feet. The test is about 3 miles north of the Flag Lake field, also of Henderson County.

LOFFLAND BROTHERS received contract from Fohs Oil Co. for a 12,000-foot test to be drilled in the Dulac field, Terrebonne Parish, Louisiana, which holds the distinction of being the deepest producing field in the world. The well is about 1 mile northwest of the discovery well which was completed last year through perforated casing at 13,254-66 feet. Piling is being driven at the location and the rig will be moved in during the next few days.

Manning & Martin, contractors, Tulsa and Denver, are drilling below 3,140 feet with heavy-duty Diesel-electric rig for Sinclair Prairie Oil Co. No. 1 Tubbs, in Ordovician area of Crane County, West Texas

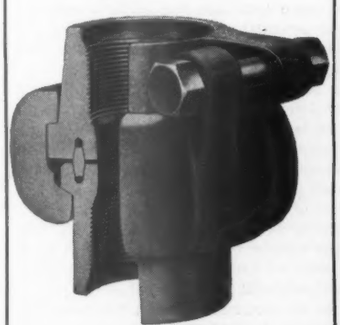
RED BALL CUTTING SERVICE

At the Head of the Table in Our Business

The RED BALL Cutting Service has consistently cut and recovered more pipe than all other cutting services combined in the territory where we operate.

J. S. Abercrombie Co.
21st FLOOR GULF BLDG.
HOUSTON - TEXAS

UNIBOLT
"Available Wherever There is Oil!"



EFFICIENT!

For example, the 2" size: Weighs 12 pounds; Test Pressure—6000 pounds; Safety Factor—7.3 (14.3 at 3000 pounds).

Interchangeable Parts.

UNIBOLT
THE ONE BOLT COUPLING

THORNHILL-CRAVER CO., INC.
HOUSTON, TEXAS

REED'S 'B-R' DRILLING BIT WITH WIRE LINE RETRACTABLE CORE BARREL

ANY NUMBER OF CORES CAN BE TAKEN (REGARDLESS OF DEPTH) WITHOUT REMOVING THE DRILL PIPE

REED 'B-R' Drill Collar and 3-Blade Drilling Bit with Core Barrel in position

HARD FORMATION HEAD (INTERCHANGEABLE WITH SOFT FORMATION HEAD)

REED ROLLER BIT CO.

LONG LIFE

When you buy a Pump, look into its family history. Find out how long its brother Pumps have been running without repairs or shut-downs. Ask your neighbors about their Pump experience.

We couldn't risk this suggestion if we didn't have the life-long records of Pomona Pumps in every country on earth and in every kind of service.

Call on the nearest Pomona Distributor and get the real facts that have made Pomona Pumps the first choice of experienced operators and critical engineers—everywhere.

POMONA PUMP CO.
Manufacturing Plants:
Pomona, California St. Louis, Missouri
Branch Offices: New York • Chicago • Los Angeles • San Francisco • Sacramento
Atlanta • Houston

POMONA
Water-Lubricated
TURBINE PUMPS

Oklahoma Operations

By
DAL DALRYMPLE

Twenty-second Ramsey Well Completed for 14,808 Bbls.

The rich Wilcox sand in the Ramsey pool, southwest of Stillwater in Payne County, Oklahoma, has paid off again, this time at the rate of 1,233 bbls. of oil in two hours to give Mid-Continent Petroleum Corp. and others No. 9 Ramsey, SE SE NW Section 18-18-2e, a daily potential of 14,808 bbls. It is the twenty-second producer to be completed in the pool and the twenty-first on the community block.

Wilcox sand was topped at 4,797 feet, and the hole was bottomed at 4,832 feet. The well flowed 641 bbls. of oil the first hour after washing in, and 592 bbls. the second hour. Gas gauged 6,800,000 and 6,750,000 cu. ft. in the two hours, respectively.

The No. 9 Ramsey is the third largest producer in the pool, the largest being No. 2 Ramsey, NW SW NW Section 18, with potential of 15,240 bbls., and No. 6 Ramsey, NE SW NW Section 18, the second largest with potential of 15,146 bbls.

The new producer is midway between No. 4 Ramsey, its west offset which had potential of 8,400 bbls., and Stanolind Oil & Gas Co. and others No. 1 Walters, its east offset and first producer to be completed outside the community block and which made potential of 3,240 bbls.

Next producer in the pool was due for completion this week at Mid-Continent Petroleum Corp. No. 1 Simpson, SE SW SW Section 7-18-2e, farthest north test and outside the community block. It topped Wilcox sand at 4,824 feet and cored saturated sand from 4,832 feet to 4,840 feet, total depth.

Two more Ramsey producers are due for completion this week. One is the Mid-Continent Petroleum Corp. and Carter Oil Co. No. 1 Nottingham, NW NW SE Section 18, outside the block and south offset to the Stanolind producer. It had oil showing in Wilcox sand at 4,832-42 feet, total depth, and casing was being run preparatory to completion. The other is Mid-Continent and others No. 1 Simpson, SE SW SW Section 7-18-2e, farthest north test and also outside the block. It topped Wilcox sand at 4,824 feet and cored saturated sand from 4,832 feet to 4,840 feet, total depth.

A new productive area was uncovered in northern Stephens County at Phillips Petroleum Co. No. 1 Culbertson, NW NW SE Section 4-1n-5w, north of the shallow Cruce gas pool. It had sand at 5,584 feet and cored at 5,586-98 feet, recovering 12 feet of sand showing oil. Cable tools were rigged up and after deepening to 5,602 feet, it was reported to have flowed 120 bbls. of oil with good gas volume in 30 minutes, and had 4,500 feet of oil in the hole. Gas-oil separator was to be installed and new connections made for testing and completion.

Atlantic Refining Co. No. 1 Atkinson, NW NW SW Section 17-6-6, wildcat west of the Konawa pool in Seminole County, topped second Wilcox sand at 3,956 feet, water was showing at 4,023½ feet, total depth, it was plugged back to 3,819 feet and drilled out to 3,839 feet. It was acidized, pumped 17 bbls. of oil and 164 bbls. of water in 24 hours and was completed. Dolomite was topped at 3,780 feet.

Wildcat Operations

H. S. Moss No. 1 Leachman, C N half SE NE Section 34-10-6, Cromwell sand pool opener in the Searight district, Seminole County, had initial production of 1,000 bbls. of oil in 7½ hours while running tubing, and was completed after plugging back from 4,630 feet, total depth, to 4,264 feet. Estimated potential was 2,000 bbls., open flow.

Champlin Refining Co. No. 1 Allen, SE SE SE Section 26-24-8w, wildcat southeast of the Hillsdale area in Garfield County, topped dolomite at 7,000 feet, first Wilcox sand 7,030 feet, second Wilcox sand 7,070 feet, and was dry and abandoned at 7,110 feet, total depth.

Kerlyn Oil Co. No. 1-A Hein, NW NW NW Section 36-22-4w, wildcat on the west flank of the Garber pool, Garfield County, had dug cellar and pits. It is scheduled to test second Wilcox sand.

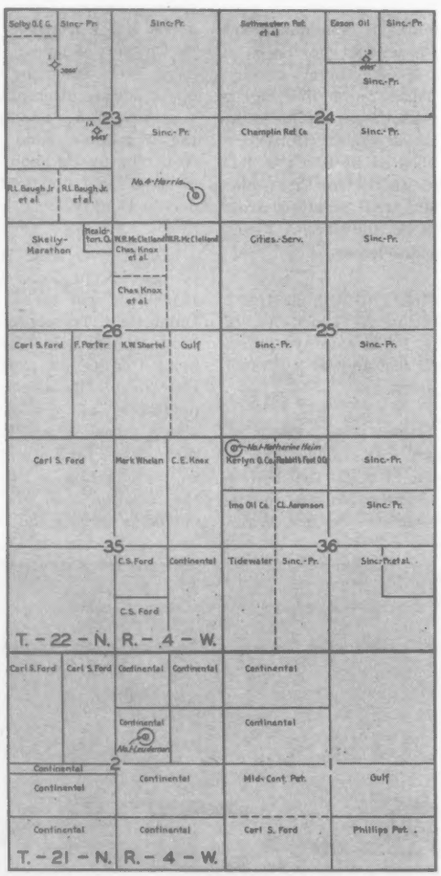
Kaw Oil Co. No. 1 Wolfenbarger, NW NW SE Section 9-27-4, Kay County wildcat, had spudded to 60 feet, but was reported abandoned.

Robinson and others No. 1 Clay, SW SW NW Section 21-4-3, wildcat in the Stratford area, Garvin County, was a rig.

Pontotoc County

Magnolia Petroleum Co. No. 6 Simpson, NW SE NE Section 29-2n-7, an old well in the Fitts district, Pontotoc County, was plugged back from 3,641 feet to 1,660 feet, ripped casing and produced 4,500,000 cu. ft. of gas from pay at 1,275-79 feet.

J. E. Crosbie, Inc., No. 2 D. Harden, NE SW NE Section 30-2n-7, an old well, was deepened from 4,270 feet to 4,310 feet, was shot and pumped 28 bbls. of 37.9-gravity oil in 24 hours.



Midcontinent Map Co., Tulsa

Three wells have been started on the west and southwest flanks of the old Garber pool, Garfield County, seeking Wilcox sand production. Numerous old producers in Sections 23, 24, 25, 26 and 36 are not shown on the map. Several horizons are productive at Garber, but oil has not been found in Wilcox sand in that area

Simpson-Roodhouse No. 4-A Wooley, SW NE SE Section 28-2n-7, an old well, was recompleted for 30 bbls. of oil daily after deepening from 4,285 feet to 4,362 feet.

Skelly Oil Co. No. 2 Smith, NE NE NE Section 35-2n-6, an old well, was dry and abandoned after plugging back from 3,855 feet to 1,275 feet.

Patsy Oil Co. No. 2 Bates, NE NW SW Section 26-2n-7, was a rig.

Pottawatomie County

F. W. Cooper No. 1 Green, NE SE NE Section 35-7-4, an old well in the St. Louis field, Pottawatomie County, was deepened from 4,143 feet to 4,180 feet, and pumped 143 bbls. of oil and 1,100 bbls. of water in 24 hours, recompleted. Gravity of the oil was 39.2 degrees. Production was from dolomite at 4,130-80 feet.

Same operator's No. 2 Green, SW SE NE Section 35-7-4, was recompleted after deepening from 4,150 feet to 4,355 feet and acidizing. It pumped 76 bbls. of 38.4-gravity oil and 1,200 bbls. of water from dolomite at 4,145-4,355 feet.

Denver Producing & Refining Corp. No. 1 Ray, NW SE NE Section 2-6-4, an old well, was deepened from 4,027 feet to 4,139 feet, total depth in Viola lime topped at 3,969 feet, and pumped 50 bbls. of 27.9-gravity oil and 2,100 bbls. of water in 24 hours.

Westheimer & Neustadt No. 1 Bruno, SE SE SE Section 31-7-5, was deepened from 4,095 feet to 4,137 feet, acidized and recompleted. It pumped 146 bbls. of 38.9-gravity oil and 192 bbls. of water in 24 hours from dolomite topped at 4,035 feet.

Farmer's Mutual Co. No. 2 School Land, SW SW NE Section 16-5-5, was plugged back from 2,450 feet to 2,405 feet, shot and pumped 5 bbls. of oil daily.

Cooper Drilling Co. and Reda Pump Co. No. 2 Bewley, SE SE NW Section 36-7-4, topped dolomite at 4,347 feet, total depth 4,373 feet, was acidized and completed for initial potential of 172 bbls. of oil.

Cooper Drilling Co. No. 1 Zoeller, NE SE SE Section 30-7-5, was abandoned at 70 feet.

J. F. Smith No. 2-A Woods, NW NW SW Section 31-7-5, was completed for initial yield of 372 bbls. of oil daily at 4,386 feet, total depth.

Same operator's No. 3 Tartar, NW SW SW Section 32-7-5, found dolomite at 4,030 feet, total depth 4,055 feet, was treated with 6,000 gallons of acid and had initial daily yield of 720 bbls. of oil.

Portable Drilling Co. No. 1 Eddy, NW NW NE Section 21-8-5, Maud district, topped Hunton lime at 4,046 feet, was bottomed at 4,269 feet, acidized with 5,000 gallons, and was completed for 15 bbls. of oil daily.

New work in Pottawatomie County: Oklahoma Oil Corp. No. 1 Thomas, SE SW SE Section 29-7-4, rig; Tabor, Coleman & Hissom No. 2 Miller, SW SE SE Section 29-7-5, spudded; same operators' No. 3 Miller, SE NW SE Section 29-7-5, set 10-inch casing at 82 feet, waiting on cement; Hall & Briscoe No. 4 Smith, NW NE NE Section 32-7-5, spudded.

Seminole County

Simpson-Roodhouse No. 1-A Eleanor, SE cor. Section 11-6-5, Grayson area, Seminole County, topped Earlsboro sand at 2,808 feet and was dry and abandoned at 2,865 feet, total depth.

Phillips Petroleum Co. No. 1 Carpenter, NE NE NE Section 27-7-6, an old well in the Little River area, was plugged back from 3,121 feet to 2,904 feet and was dry and abandoned.

Sunray Oil Co. No. 1 Swan, SW NE SE Section 12-6-5, Grayson pool, found dolomite at 3,742 feet, total depth 3,984 feet, plugged back to 3,837 feet, was acidized with 2,000 gallons and had initial 24-hour yield of 324 bbls. of oil.

J. F. Smith and others No. 1-A Williams, SE SE NW

Section 28-7-6, West Little River area, was dry and abandoned at 3,372 feet, total depth.

W. W. Hall No. 1-A Cully, NW NW NW Section 11-8-6, Bowlegs area, was dry and abandoned at 4,190 feet, total depth.

Gillespie & Moore No. 1 Davis, NW NW SW Section 18-8-7, was dry and abandoned at 2,344 feet, total depth.

Cities Service Oil Co. No. 1 Coker, SW SE SW Section 13-7-6, Little River distsrict, an old well plugged back from 4,682 feet to 4,521 feet, was acidized and recompleted for 61 bbls. of oil daily.

First reports of new activity in Seminole County: Malarnee and others No. 6 Shelton, SE SW NW Section 33-7-6, Dora area, spudded; F. W. Cooper Drilling Co. No. 1 Cosar, SE NW SW Section 12-6-5, Grayson area, drilling below 400 feet; Patterson and others No. 1 Johnson, NW SW SW Section 27-6-5, West Konawa area, spudded; J. F. Smith and others No. 1 Yarhola, SE NE SW Section 2-8-6, Bowlegs field, rig on ground; R. M. Love and others No. 1 Abbott, NW SE NE Section 33-8-7, East Little River pool, rigging up rotary.

Estimated Daily Production

Estimated daily production for Oklahoma for the week ending March 25, and for the preceding week, was as follows:

	Barrels	
	Mar. 25	Mar. 18
Allen	5,775	5,575
Billings	5,225	5,125
Burbank	7,775	7,675
South Burbank	9,325	9,250
Balance Osage	18,600	18,500
Blackwell district	3,925	3,750
Bristow-Slick	6,975	6,900
Chandler	1,600	1,725
Crescent	3,175	3,450
Cromwell	3,100	3,075
Cushing-Shamrock	10,200	10,025
Duncan district	3,775	4,150
Edmond	4,525	4,575
Fish	3,375	2,400
Fitts	30,125	30,150
Jesse	2,450	2,275
Graham-Fox	4,225	4,375
Gray	875	775
Healdton	9,150	8,800
Hewitt	3,525	3,575
Keokuk	3,650	3,725
Konawa	1,100	1,075
Lucien	8,225	7,875
Moore	3,425	3,850
Oklahoma City	116,250	117,800
Olympic	3,375	3,250
Ramsey	3,250	3,250
Sasakwa	1,350	1,325
Sholem-Alechem	2,275	2,250
Seminole district:		
Bowlegs	8,175	7,750
Carr City	3,025	3,000
Dora	4,275	4,300
Earlsboro	4,625	4,325
South Earlsboro	500	525
East Earlsboro	4,225	3,975
Little River	7,200	6,550
East Little River	775	700
Maud	1,075	1,025
Mission	1,525	1,400
Seminole	7,675	7,425
East Seminole	1,450	1,425
Searight	2,400	2,225
Total Seminole	46,925	44,625
St. Louis-Pearson	29,450	27,750
Tatums	1,850	1,625
Tonkawa-Garber-Thomas	4,000	4,025
Wewoka	2,025	2,050
Yale-Jennings	3,600	3,625
Other pools	83,000	82,250
Total Oklahoma	451,450	446,475

Lincoln County

Cooper Drilling Co. No. 4 School Land, NW SE NE Section 16-14-6, Sac and Fox pool, Lincoln County, was shot with 380 quarts and completed for daily production of 350 bbls. of oil. Prue sand was topped at 3,006 feet, total depth 3,125 feet.

Wilcox Oil & Gas Co. No. 22 Sac and Fox, NE SE SE Section 16-14-6, found Prue sand at 2,948 feet, was bottomed at 3,048 feet, shot with 270 quarts, and produced 160 bbls. of oil in 24 hours.

Mudge Oil Co. No. 1 Teters, SW SE NE Section 9-14-6, had Prue sand at 3,094 feet, total depth 3,115 feet, was shot with 85 quarts and had initial daily yield of 75 bbls. of oil.

Coralena Oil Co. No. 2 Sac and Fox, NW NE SE Section 16-14-6, was shot with 205 quarts and pumped 115 bbls. of oil in 24 hours from Prue sand topped at 2,970 feet, total depth 3,055 feet.

Payne County

Texas Co. No. 2 Minnich, C E half SE NE Section 11-17-1e, Coyle pool, Payne County, found first Wilcox sand at 4,910-37 feet, total depth 4,952 feet, flowed 230 bbls. of oil in 24 hours and, later, flowed 220 bbls. in 24 hours, through 1-inch choke, one fourth round open.

Magnolia Petroleum Co. No. 1 Cain, C W half NW SW Section 12-17-1e, had first Wilcox sand at 4,872-77 feet, total depth, and flowed 690 bbls. of oil through

SELF-ALIGNMENT
Built into the Bearing

Shafer CONCAVE roller design provides self-alignment within the bearing itself, permitting rugged mountings while avoiding unnecessary size and weight. Only Shafer combines:

1 Integral self-alignment

2 Capacity for radial, thrust, or combined radial-thrust loads

3 Simple adjustability

Performance is consistently maintained, even under severest operating conditions.

Shafer Welded Steel Pillow Block—compact and exceptionally rugged

SHAFER BEARING CORPORATION
35 East Wacker Drive
Chicago, Illinois

●

Available in a full range of sizes: Pillow Blocks · Welded Steel Pillow Blocks Flange Units · Take-up Units · Hanger Boxes · Cartridge Units · Conveyor Rolls Flange-Cartridge Units · Duplex Units Radial-Thrust Roller Bearings

Catalog No. 14 gives complete data on Shafer Roller Bearings and Units. Write for your copy.

SHAFER **SELF-ALIGNING ROLLER BEARINGS**

BUILD
at
LOW COST
MIDGET CRACKING PLANTS
Immediate Delivery
of
Complete Manufacturing and Construction Drawings along with Specifications and Bills of Materials.

Inquiries on other Refinery Processes, Engineering and Design invited.

STEPHEN SWARTZ
9023 S. LOOMIS ST. CHICAGO, ILL.

FLOORING OF SUPERIORITY

1. Non-slipping
2. Safer
3. Stronger
4. Better Ventilation
5. Cleaner
6. Fireproof
7. Better Fitting
8. Easier to walk, work or wheel upon.

A non-slip perfect traction floor for refinery and tank platforms, walkways and safety steps. Also for areaways, trench covers, boiler room floors and bridges, with a choice of designs for any span or load.

Oklahoma Rep.: L. H. Saunders, P. O. Box 1183, Tulsa Tel. 3-7186. *Write for Catalog.*

Kerlow Steel Flooring Company
218-0 Culver Avenue Jersey City, N. J.

casing in 24 hours. It then flowed 186 bbls. in four hours through tubing, with 1,100 pounds casing pressure. Gravity of the oil was 38 degrees.

Same company's No. 2 Cain, C E half NW SW Section 12-17-1e, was a location in the Coyle area. Mid-Continent Petroleum Corp. and others No. 6 Columbia, SW NW SW Section 18-18-2e, Ramsey pool, was digging cellar.

Osage-Pawnee-Tulsa Counties

Ohio Oil Co. and others No. 12 Osage, SE NE NW Section 34-21-9, Osage pool, Osage County, was dry and abandoned at 624 feet, total depth.

Olson Drilling Co. No. 1 Osage, SW NE NE NE Section 23-26-4, topped Wilcox sand at 3,583 feet, Arbuckle lime 3,620 feet, had nothing showing and was dry and abandoned at 3,725 feet, total depth.

Renlands and others No. 1-A Ackley, SW NE SE Section 14-20-9, Pawnee County, was abandoned at total depth of 2,200 feet.

Ray Branstetter and others No. 3 Osage, SE SE SE Section 29-22-11, was a location. Barnsdall Oil Co. No. 9 Osage, SW NE SW Section 23-24-10, was a location.

Cummings Brothers No. 1 fee, NW NW NW Section 28-17-13, Tulsa County, was drilling below 1,005 feet. Sendorf and others No. 1-A Depriest, SE SE NE Section 35-17-12, was drilling below 300 feet.

Creek County

Lease Investment Co. No. 1 Perryman, SW NE NW Section 28-14-10, Creek County, was completed for initial daily yield of 540 bbls. of oil at 3,268 feet, total depth. Misener sand was topped at 3,265 feet.

Frances Oil & Gas Co. No. 1 Pinehill, SE NE SE Section 16-17-9, found Bartlesville sand at 2,412 feet, total depth 2,471 feet, was shot and pumped 20 bbls. of oil in 24 hours.

Petroleum Drilling Co. No. 1 Endicott, NE SW NE Section 13-19-7, was dry and abandoned at 2,714 feet, total depth.

Sooner Oil & Gas Co. No. 2 Tiger, NE NE NW Section 16-18-12, had sand at 1,132-65 feet, total depth, and produced 2,000,000 cu. ft. of gas daily, with 450 pounds rock pressure.

E. Shamblin and others No. 1-A Roller, SE NE NE Section 13-17-10, topped Red Fork sand at 1,878 feet, total depth 1,914 feet, was shot and completed for 48 bbls. of oil daily.

New activity in Creek County: Sooner Oil & Gas Co. No. 1-A Lasley, SE SW SE Section 9-18-12, was a location; E. Shamblin and others No. 1 Taylor, SW SE NW Section 18-17-11, machine; D. B. Siebert and others No. 2 Taylor, SW NW NW Section 18-17-11, drilling below 410 feet; Doke-Hughes No. 1 Brim, NW SW NW Section 18-17-11, drilling below 1,010 feet.

Okfuskee-Muskogee Counties

Shell Petroleum Corp. No. 2-A Keys, NE SE NW Section 11-11-8, Dill pool, Okfuskee County, topped Cromwell sand at 3,364 feet, total depth 3,402 feet, was shot and completed for 148 bbls. of oil in 24 hours.

Harry Stekoll No. 1-A Holmes, NW SE NE Section 16-11-11, Deaner pool, Okfuskee County, pumped 18 bbls. of oil in 24 hours and was completed at 2,680 feet, total depth.

Metzger & Foltz No. 10 Francis, CNL NW SW Section 1-14-18, Muskogee County, was dry and abandoned at 916 feet, total depth.

Bryan Petroleum Co. No. 3 Mathews, CSL SW NE Section 19-15-15, was a location, and Swick Oil Co. No. 1-A Millison, SE SE NE Section 32-15-15, was a machine. Both are in Muskogee County.

In Okfuskee County: C. A. Sivels No. 1 Montray, SW NE NE Section 21-11-11, was drilling below 330 feet; Shell Petroleum Corp. No. 7 Johnson, NW SE NW Section 11-11-8, Dill pool, was a location.

Southwestern Oklahoma

R. O. Ray and others No. 1 Shirley, SE NE NE Section 6-1s-19w, Tipton pool, Jackson County, found Granite Wash at 2,453-2,586 feet, total depth 2,596 feet, was shot and pumped 68 bbls. of 40-gravity oil in 24 hours.

C. W. Tomlinson No. 4 Montgomery, NW NW SE Section 11-2s-8w, Comanche pool, Stephens County, had sand at 2,040-64 feet, total depth 2,075 feet, and pumped 20 bbls. of 35-gravity oil in 24 hours.

Magnolia Petroleum Co. No. 7 Hedlund, SE NW NE Section 11-5-9w, an old well in the Cement field, Caddo County, was deepened to 3,945 feet and recompleted for 18 bbls. of oil daily.

R. O. Ray No. 2 Ellis, SE SW NW Section 5-1s-19w, Tipton area, Jackson County, was drilling below 50 feet. Wichita Oils, Inc., No. 10 Noble, NE NW NW Section 28-2n-10w, Lawton area, Comanche County, was a derrick. West Oak Gas Co. No. 1 Coogan and others, C SE NE Section 3-9-25w, Erick pool, Beckham County, was a derrick.

Miscellaneous First Reports

Gulf Oil Corp. No. 2 Campion, C NW SW Section 27-17-4w, Crescent pool, Logan County, an old well bottomed at 6,255 feet, was pulling casing to test Layton sand.

Gulf Oil Corp. and Carter Oil Co. No. 1 Knowles, C NW NW Section 34-17-4w, Crescent pool, an old well plugged back from 6,296 feet to 6,097 feet, was bailing preparatory to testing Layton sand.

U. S. Petroleum Co. No. 2 Sinapoula, SE SW SW Section 15-12-3w, Oklahoma City field, Oklahoma County, an old well being deepened from 4,800 feet, was drilling below 5,437 feet.

Joe Barrett and others No. 19 Hinkle, NE SE NW Section 20-3s-2w, Wheeler pool, Carter County, had sand at 200-39 feet, total depth, and was estimated good for 2 bbls. of oil daily.

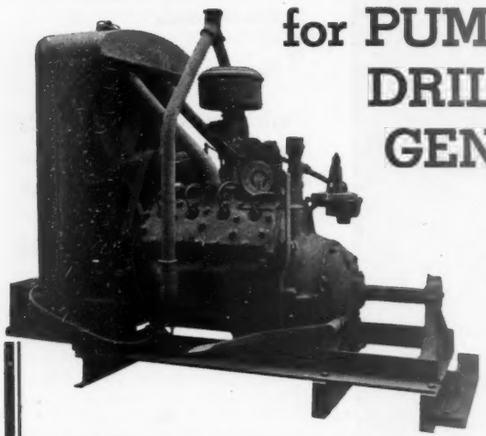
Roy Kyle No. 6 Daugherty, NE SW SW Section 17-4s-2w, Hewitt field, Carter County, was a derrick.

San Joaquin Basin

LOS ANGELES, Calif., Mar. 27.—The Texas Co. completed a small well in the Midway-Sunset field of Kern County last week when No. 33 in Section 32-32-24 with an elevation of 866 feet was brought in pumping 40 bbls. of net 22.9-gravity oil which shows a cut of 20 per cent. This new well was finished at 3,183 feet with a 6⅝-inch water string landed at 3,123 feet and 117 feet of 5-inch liner including 40 feet of 100-mesh perforations landed at 3,182 feet and gravel packed behind the liner. In the Kern River field, Combs Brothers have completed No. 1 in Section 28-28-28 pumping 10 bbls. of 13.2-gravity oil cutting 3 per cent from 521 feet.

Standard Oil Co. is making preparations to complete No. 2 Mushrush in the Wasco field of Kern County and it should be tanking oil within a few days as casing has been run in with bottom of the hole at 13,080 feet, in the pay.

General Power Conversions for PUMPING DRILLING GENERATING



General Power Units are the most economical in their horsepower range—Ford V-8, 60 h.p., 85 h.p., and 95 h.p. because all units are designed and made complete in one plant. All units are finished with new material of latest design.

Economy of operation, low cost fuel and oil, and low maintenance cost due to nation-wide Ford service. All units operate on natural gas or gasoline. Butane equipment is also available.

GENERAL POWER G SERIES

Adapted for general power applications where an outboard bearing is desired. Equipped with a large, Ford truck type clutch.

Floor space 27" wide, 62½" long. Available in all three engine sizes.

OIL FIELD SPECIAL

Extra heavy construction for oil field use. Has large, four speed transmission. Available as single unit (pictured), or as dual or triple engined units mounted on single skid for drilling or generating. Units have been made with six synchronized engines.

For prices and information—Write, Wire, or Phone

GENERAL POWER, INC.

QUAPAW, OKLAHOMA Phone 64

Kansas Developments

By
DAL DALRYMPLE

Wildcat Near Ellinwood Has Saturation in Arbuckle Lime

The opening of a new pool in Barton County appeared imminent at York State Oil Co. No. 1 Marchand, CEL NE NE Section 24-20-12w, 1½ miles west of the Hagen and Clawson pools and about 3 miles south of the town of Ellinwood. It found Arbuckle lime at 3,308-10 feet, with saturation showing in cores. Standard tools were being rigged up preparatory to drilling in.

The Ellinwood pool in Barton County was extended one-half mile southeastward at Stanolind Oil & Gas Co. No. 3-B Jutting, SE NW NE Section 15-20-11w. It had Arbuckle lime at 3,296-3,303 feet, total depth, was acidized and made potential of 421 bbls. of oil. Location is about 4 miles southeast of Ellinwood.

Continental Oil Co. No. 1 Putnam A, CWL NW Section 23-9s-21w, apparently was extending the Morel pool in Graham County 1¼ miles southeastward. It entered Arbuckle lime at 3,793 feet, set 7-inch casing at 3,794 feet, cored to 3,799 feet and had a 4-foot recovery with good saturation. The crew was standardizing for completion.

The Gorham pool in Russell County was extended one-half mile to the southeast at Phil-Han Oil Co. and others No. 1 Neidenthal, NW NE NW Section 13-14-15w. It swabbed 6 bbls. of oil an hour in preliminary tests from Lansing lime at 3,057 feet, total depth. Six-inch casing was set on top of the lime and it was due for early completion. Location is five-eighths of a mile north of the Neidenthal pool.

Martin & Hearing No. 1-A Feltes, NW SW SE Section 8-16-12w, Topeka lime discovery well five-eighths of a mile northwest of the Beaver pool, Barton County, was being deepened. It topped Topeka lime at 2,680 feet, had pay at 2,885-90 feet and flowed at the rate of 20 to 40 bbls. of 35.3-gravity oil an hour with 12,000,000 cu. ft. of gas. The gas was killed, 8-inch casing was cemented at 2,858 feet, it was drilled out to 2,900 feet, lugs lost in the hole were recovered and the crew was drilling ahead.

The Buhler pool in Reno County was extended one-half mile westward at Westgate-Greenland Oil Co. No. 1-B Johns, SE SE SW Section 25-22-5w. It made 24-hour potential of 850 bbls. of oil from Simpson sand at 3,917 feet, total depth.

Estimated Daily Production

Estimated daily production for Kansas for the week ending March 25, and for the preceding week, was as follows:

	Barrels	
	Mar. 25	Mar. 18
Oxford City	1,050	1,075
Burrton	8,850	8,275
Ritz-Canton	5,775	5,575
Graber	3,275	3,750
Hollow-Nikkel	2,775	2,950
Lerado	650	775
Voshell	1,725	1,625
Wellington	2,150	2,075
Ellsworth County:		
Lorraine	1,850	1,900
Other pools	1,535	1,310
Rice-Barton counties:		
Bloomer	2,525	1,900
Chase	4,525	4,375
Geneseo	2,125	3,975
Raymond	450	950
Silica	11,400	10,450
South Silica	2,350	2,025
Keesling	800	925
Wherry	4,250	4,350
Miscellaneous Rice	8,980	7,235
Miscellaneous Barton	7,755	8,060
Russell County	24,200	24,475
Sedgwick County	3,800	3,825
Ellis:		
Bemis	5,800	5,675
Miscellaneous	4,265	2,640
Kingman County	765	830
Stafford County	6,580	5,415
Greenwood County	9,000	8,900
Butler County	19,900	19,675
Other fields	17,645	16,185
Total Kansas	166,750	161,175

Among the Wildcats

Phillips Petroleum Co. No. 1 Esau, CEL W half NE Section 7-21-4w, wildcat in McPherson County, found Arbuckle lime at 3,992-4,012 feet, total depth, had nothing showing and was dry and abandoned. Mississippi lime was penetrated from 3,363 to 3,645 feet. Misener sand was topped at 3,821 feet, Sylvan shale 3,835 feet, Viola lime 3,895 feet, Simpson zone 3,925 feet.

E. H. Moore, Inc., No. 1 Secrest, SE SE NW Section 21-25-11w, new Stafford County wildcat, was rigging up rotary. Location is on a farmout from Vickers Petroleum Co. and Phillips Petroleum Co.

Crown Petroleum Co. No. 1 Koch, NE cor. Section 23-20-12w, new Barton County wildcat, was building rig.

R. E. Day and others No. 1 Feltes, SE SE NE Section 14-16-12w, an old Barton County wildcat bottomed at 1,875 feet, now being deepened, was drilling below 2,250 feet.

Ewers-Simpson Oil Co. No. 1 Hitchman, SW SW NW Section 29-16-12w, was a location for a new Barton County wildcat.

Vernon Oil & Gas Co. and others No. 1 Dupont, SE SE NE Section 22-19-10w, wildcat in Rice County, was a location.

Cowley County

Three producers were completed in the Hittle pool, Cowley County, including the previously announced record-breaker for Arbuckle lime production in Kansas—the McKnabb & Blair No. 3 Hittle, SW SW NE Section 21-31-4. It penetrated Arbuckle lime from 3,291 to 3,301 feet, total depth, pumped and flowed 2,387 bbls. of oil in eight hours and made 24-hour potential of 7,161 bbls.

Texas Co. No. 4 Goodrich, NW SW SE Section 21-31-4, pumped and flowed 1,577 bbls. of 39-gravity oil in eight hours and was rated potentially at 4,731 bbls. daily. Production was from Arbuckle lime at 3,267-80 feet, total depth.

Arthur Brewer No. 1 King, NW SW NW Section 27-31-4, farthest southeast well in the pool, found Arbuckle lime at 3,461-77 feet, total depth, plugged back to 3,476 feet, pumped 115 bbls. of 39-gravity oil in eight hours and made 24-hour potential of 344 bbls.

One new Hittle operation was started at Arthur Brewer No. 3 Lewis, SE SW NE Section 28-31-4, moving in material.

Rice County

L. A. Farris No. 1 Purcell, SE NE NW Section 33 19-9w, Campbell pool, Rice County, topped Arbuckle lime at 3,198 feet, was bottomed at 3,230 feet, pumped 202 bbls. of oil in eight hours after acidizing with 4,000 gallons and made daily potential of 607 bbls.

Skiles No. 1 Campbell A, SW SW NW Section 27-19-9w, Campbell pool, was treated with 5,000 gallons of acid, pumped 119 bbls. of oil in eight hours and made potential of 356 bbls. in 24 hours.

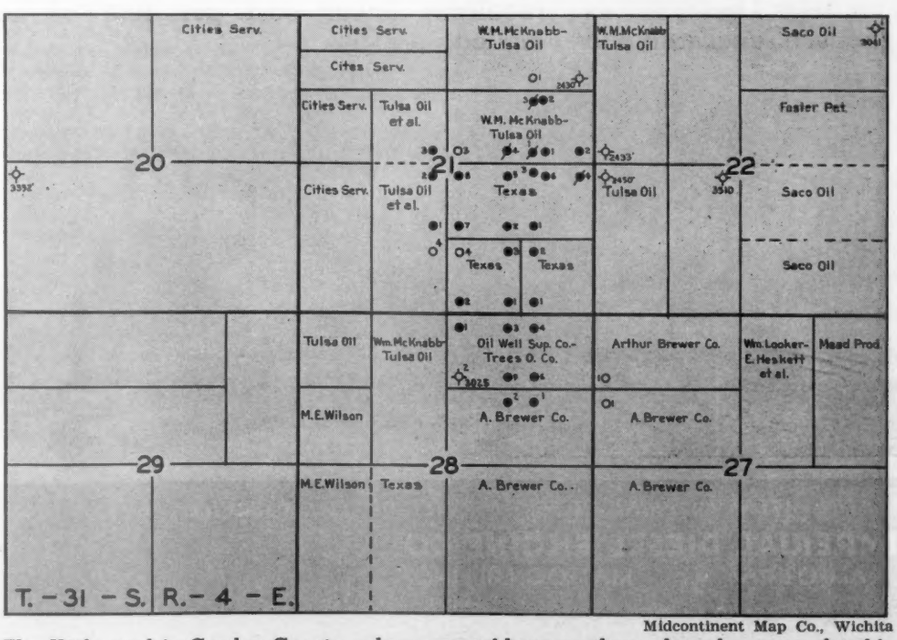
The third Campbell pool completion of the week was Lauck & Moncrief and others No. 1 Sledd, SW SE SW Section 22-19-9w. It had Arbuckle lime at 3,205-36 feet, total depth, pumped 101 bbls. of oil and 8 bbls. of water in eight hours and made daily potential of 302 bbls. of oil.

Shell Petroleum Corp. No. 2 McFarland, NE NE NW Section 7-20-9w, an old well in the Chase pool, was plugged back from 3,279 feet to 3,055 feet, acidized with 1,000 gallons and made potential of 504 bbls. of oil.

Same company's No. 14 Zajic, SW SE NE Section 13-18-10w, was a rotary rig. Cities Service Oil Co. No. 2 De Witt, SW NW NE Section 33-19-9w, was building rig. C. B. Davis No. 1 Keesling, SE SE SW Section 10-20-9w, was drilling below 240 feet.

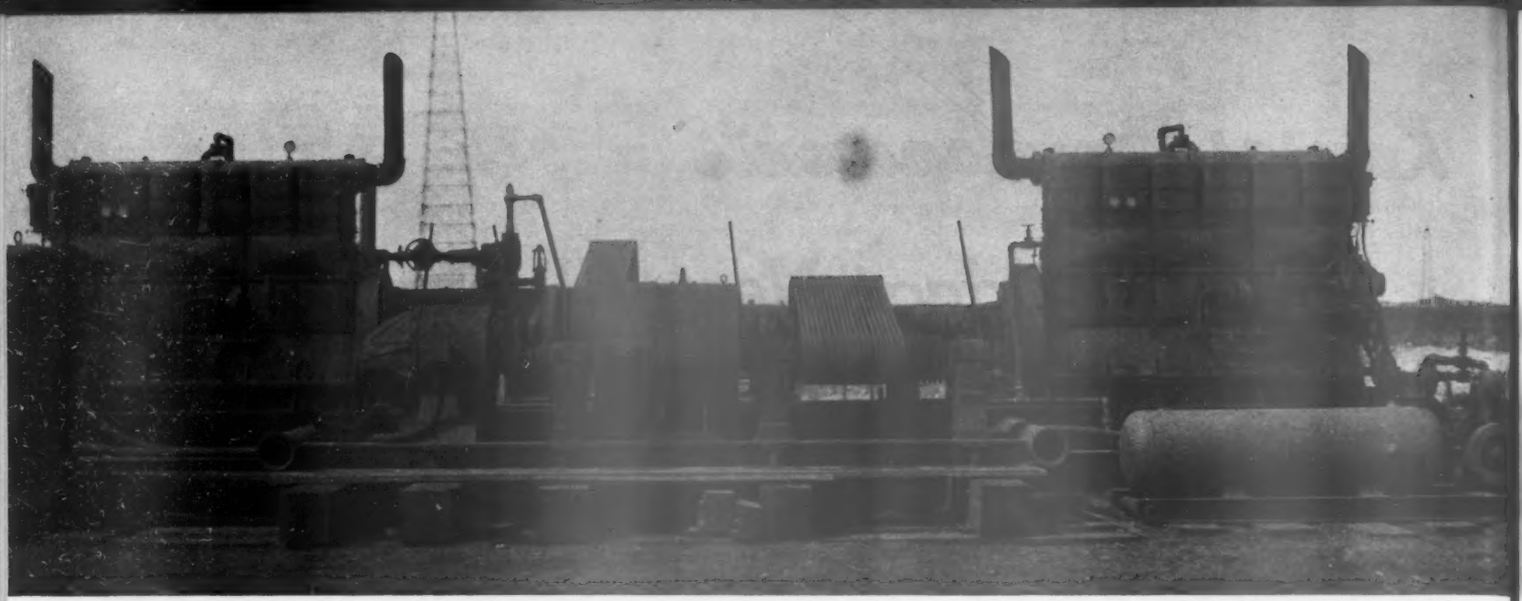
Barton County

Sinclair Prairie Oil Co. and others No. 2 Seyfert,

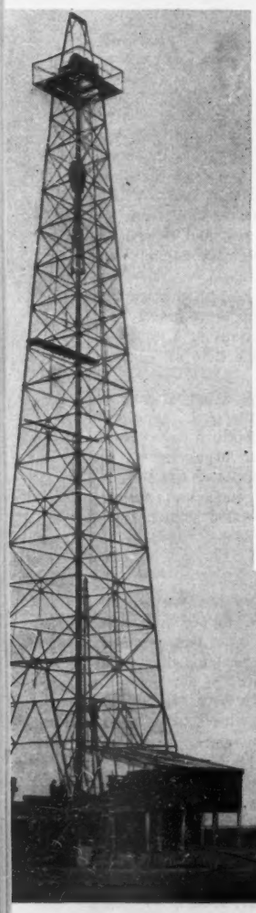


Midcontinent Map Co., Wichita

The Hittle pool in Cowley County, where several large producers have been completed in recent weeks, was extended one-fourth mile southeastward the past week at Arthur Brewer No. 1 King, NW SW NW Section 27-31-4e



Bert Fields, Dallas Driller, uses—
ATLAS DIESEL POWERED RIG

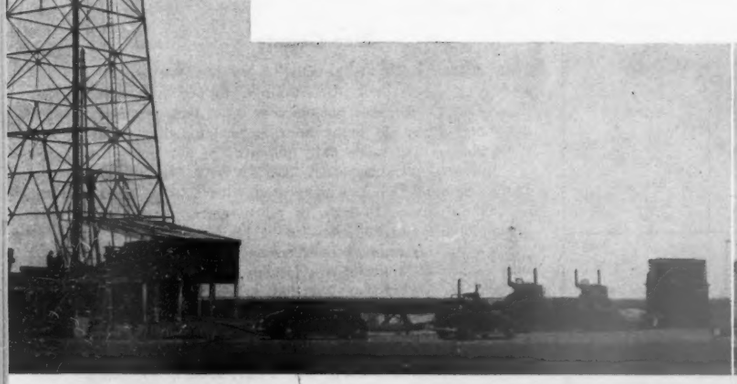


The Atlas-Richards electrical-mechanical drilling rig shown here on a West Texas location is owned by Bert Fields, Drilling Contractor of Dallas, Texas.

This unit is the standard Model OD-200. This rig is powered by a pair of dependable 200 H.P. Atlas Diesels of the heavy duty, medium speed, fully enclosed type, which have been making drilling history in the Mid-Continent field.

In this hookup, one Atlas Diesel drives a 250 K.W. Westinghouse Generator and 20 K.W. Exciter. The drilling and hoist motor is of 300 H.P. capacity and drives the draw works through a Falk reduction gear unit.

The slush pump is driven mechanically from the engine. All equipment is mounted on oil field type skids for easy handling and portability. Ease of operation together with the dependable and economical performance of the Atlas Diesels makes for faster drilling at any depth with resultant lower cost per foot of hole drilled.



SEND FOR A COPY OF OUR BULLETIN "ATLAS IMPERIAL DIESELS FOR ALL OIL FIELD SERVICE"

ATLAS IMPERIAL DIESEL ENGINE CO.

OAKLAND, CALIFORNIA · · MATTOON, ILLINOIS

Oil Country Distributors

K. S. RICHARDS · WICHITA · OKLAHOMA CITY · FORT WORTH · HOUSTON

ATLAS IMPERIAL

SW SW SW Section 21-16-11w, Prusa pool, Barton County, topped Arbuckle lime at 3,337 feet, was bottomed at 3,352 feet and was treated with 2,000 gallons of acid. It pumped 37 bbls. of 41-gravity oil in eight hours and made potential of 110 bbls.

Stanolind Oil & Gas Co. No. 12 Kowalsky, CSL N half NE Section 11-20-11w, Silica field, topped Arbuckle lime at 3,312 feet, Basal sand at 3,815 feet, total depth 3,872 feet and was completed as a water disposal well.

Tom Palmer No. 2 Casey, C N half S half NE Section 4-16-12w, was rigging up rotary.

McPherson County

Phillips Petroleum Co. and Shell Petroleum Corp. No. 1 Lega, SE SE SE Section 30-19-1w, an old well in the Ritz-Canton field, McPherson County, topped chat at 2,939 feet and originally was bottomed at 2,943 feet. It was deepened to 2,983 feet and pumped 53 bbls. of oil in 24 hours.

Same operators' No. 1 Wiles, SE SE NE Section 25-19-2w, an old well, was plugged back from 3,413 feet to 2,960 feet in chat, and made potential of 54 bbls. of oil daily.

Russell County

W. I. Southern, Inc., No. 1 Berry, SW NE NW Section 27-15-13w, Fairfield pool, Russell County, topped Lansing lime at 3,098 feet, Arbuckle lime at 3,370 feet, had a hole full of water at 3,381-82 feet, total depth, and was plugged back to 3,130 feet. It was acidized with 3,000 gallons and pumped 12 bbls. of oil and 30 bbls. of water in 24 hours.

Phil-Han Oil Co. No. 1 Reinhardt, SE NE NE Section 24-14-15w, had dug cellar.

Republic Natural Gas Co. No. 2 Resner, SE SE NW Section 23-15-14w, was drilling with rotary below 2,225 feet.

Cities Service Oil Co. No. 2 Podszus, NW SE SW Section 25-15-14w, was a location.

Greenwood County

Kaman & Roseman No. 2 Duke, SW SE SE Section 22-26-9, Reece pool, Greenwood County, found sand at 865 to 870 feet, total depth, and produced 5,000,000 cu. ft. of gas daily.

C. W. Cross No. 2 King, SE NW NE Section 36-24-12, Christy area, was completed for 500,000 cu. ft. of gas in Bartlesville sand at 1,605-60 feet, total depth.

Shaffer & Howell No. 23 Imthurn, SE SE NE Section 4-23-13, Virgil field, topped Bartlesville sand at 1,573 feet, Mississippi lime 1,753 feet, and was dry and abandoned at 1,787 feet, total depth.

New operations in Greenwood County: Katz & Veeder No. 1 Figgenberg, NE NE SE Section 2-25-8, drilling below 200 feet; Henderson Oil Co. No. 8 Harian, SW NW NW Section 34-22-11, rigging up machine; Oko Oil & Gas Co. No. 16 Shadel, NW SW SE Section 15-23-13, rigging up machine; O. F. Duncan No. 8 Schindler, C W half NW SW Section 16-23-13, drilling below 1,295 feet; Oko Oil & Gas Co. No. 12 Lovett-McNeil, NE SE SW Section 22-23-13, spudded; Hart & Sons No. 31 Johnson, SE SE NW Section 23-24-12, drilling below 800 feet.

Butler County

National Refining Co. No. 3 Pray, C N half N half SW Section 31-27-3e, Butler County, found Stalnaker sand at 2,007-26 feet, total depth, and was completed for 3,500,000 cu. ft. of gas daily.

Progressive Oil Co. No. 1 Nonken, NE SW SW Section 34-22-4e, was drilling below 700 feet. National Refining Co. No. 1 Green, C S half S half NW Section 31-27-3e, was a location.

Ellsworth County

Continental Oil Co. and others No. 1 Kunkle, C E half E half NW Section 33-17-8w, Edwards area, Ellsworth County, topped Arbuckle lime at 3,432 feet, and was dry and abandoned at 3,520 feet, total depth.

Transwestern Oil Co. and others No. 1 Daugherty, SW SW NE Section 33-17-10w, set 10-inch casing at 226 feet and was waiting at 290 feet.

New Operations

In Reno County, Westgate Greenland Oil Co. No. 1 Hegarty B, NE NE NW Section 36-22-5w, was a cellar. Derby Oil Co. No. 4 Wood, NW NW NE Section 36-22-5w, was a cellar. They are in the Buhler area.

In Stafford County, Continental Oil Co. and Cities Service Oil Co. No. 1 Mather, SE SE NW Section 12-25-13w, was moving in material.

In Ellis County, Cities Service Oil Co. No. 7 Rumsey, SW SW SE Section 23-11-17w, was building rotary rig.

In Marion County, Harwood Oil Co. and others No. 2 Novak, SE SE NW Section 28-17-4e, had spudded.

In Woodson County, Woodson County Pipe Line Co. No. 14 Kimball, NW SE NW NW Section 18-24-14, was drilling below 600 feet.

Illinois Fields

(Continued from Page 187)

In Jasper County, Thompson Drilling Co. No. 1 Bowers, C SW NE SW Section 7-8n-10e (corrected location), moving in rotary tools. Kingwood Oil Co. and Bur-Kan Oil Co. No. 1 Harrison, C W half SW SW Section 2-7n-10e, Paint Creek topped at 2,425 feet, drilling at 2,428 feet.

In Wabash County, W. M. Bartlett No. 1 Stanfield, SW SE SE Section 19-2s-13w of second principal meridian (corrected location), material on ground. Tide Water Associated Oil Co. No. 1 Cowling, SW SW SE Section 18-2s-13w, Glen Dean at 2,232 feet, drilling at 2,240 feet.

In Effingham County, Kingwood Oil Co. No. 1 Koester, NE SE SW Section 18-8n-6e, moving in rotary tools.

In Jefferson County, McQueen and others No. 1 Sorensen, NE NE NW Section 5-2s-2e, total depth 1,630 feet, running 6⅝-inch casing to 1,522 feet. I. Vawter No. 1 Sarah Kell, NW SW NE Section 9-1s-1e, drilling at 1,657 feet. Transcontinental Oil Co. will deepen No. 1 Carroll, SE NE SE Section 16-2s-1e, from present total depth of 2,227 feet. Armstrong and others No. 1 Scott, SE NW SE Section 23-3s-2e, rig up.

In Washington County, McBride, Inc., No. 1 Wiese, C NW SW SE Section 15-3s-3w, rigging up rotary; Shell Petroleum Corp. No. 1 Holston, 160 feet from north and 169 feet from east lines of NW quarter Section 22-3s-3w, location; McBride, Inc., No. 2 Wiese, C NE SW SE Section 15-3s-3w, location; Mainton Petroleum Co. No. 1 Kerwicke, 8 feet from north and 141 feet from east lines of NW NE Section 22-3s-3w, rigging up machine; Mainton Petroleum Co. No. 2 Oak

IXL OIL WELL PUMPING REDUCERS

IXL
The Mark of Quality

are designed for oil field use. They are tough, silent partners in the battle to keep production up and costs down. 80 years of engineering skill and craftsmanship stand behind each unit.

You can depend on IXL pumping reducers when you want, above all, Service!

Write for Bulletin 404—it's full of valuable engineering information and complete details on IXL Pumping Reducers.

Direct Factory Representatives:
MAX E. LANDRY
533 Mayo Bldg., Tulsa, Okla.
T. C. GRAHAM
Box 596, Overton, Texas

FOOTE BROS.
GEAR & MACHINE CORPORATION
5306 So. Western Blvd., Chicago

Grove Cemetery, 330 feet from south and 60 feet from east lines of SW quarter Section 15-3s-3w, rig up. Thompson Drilling Co. No. 1 Rosanski, NW NW SW Section 19-3s-1w, Weiler sand at 1,245 feet with spotted saturation at 1,250-60 feet, total depth 1,267 feet, set 5-inch casing at 1,237 feet.

In Perry County, Lundy & Winkler No. Stern, NW NW NE Section 8-4s-3w, rigging up machine. E. J. Shaefer No. 1 Sprague, SW NE NW Section 33-5s-4w, total depth 658 feet. Will run 10-inch casing. G. H. Blankenship No. 1 Rheinecker, NW NW NE Section 3-6s-4w, shut down at 900 feet to make repairs.

In Wayne County, R. D. Porter No. 1 Klenicke, NE SE SW Section 15-2s-9e, moving in rotary tools. A. J. Albright No. 1 Collins, NW NW SE Section 24-1s-9e, moving in rotary. New Penn Development Corp. No. 1 Scott, NW NW SE Section 7-2s-9e, total depth 3,437 feet, swabbed dry, shut down for orders. H. H. Weinert No. 1 Cunningham, C S half NW NE Section 27-2s-8e, drilling at 2,770 feet. Roche & Voyles No. 1 Jewell, C E half SW SE Section 3-2s-7e, Ste. Genevieve lime at 3,137 feet, drilling at 3,167 feet. Iroquois Oil Co. No. 1 Wingenberger, NE SW SE Section 7-3s-9e, drilling at 2,030 feet.

In Clay County, Minerva Oil Co. No. 1 Liggett, SW SW NW Section 23-5n-5e, total depth, estimated about 2,500 feet. Moving in rotary tools. Richard Duncan No. 1 Liggett, SE NW SE Section 17-5n-5e, shut down at 2,373 feet. Pure Oil Co. No. 1 Lucy Hubble, C W half NE SE Section 4-1n-8e, Fredonia at 3,020 feet, showings at intervals from 3,035 to 3,066 feet, total depth 3,113 feet, swabbed and bailed dry, acidizing. C. C. Harwell and others No. 1 Elsa Fitch, C N half SW NE Section 11-1n-8e, top of Fredonia at 3,118 feet, drilling at 3,155 feet.

In Cumberland County, Manitou Petroleum Co. No. 1 Wilcox, NW NE NE Section 20-10n-10e, cellar and pits.

In Edwards County, Leach Brothers No. 1 A. D. Lee, SW NE SE Section 11-1s-10e, McClosky at 3,363-68 feet, ran tubing with packer at 3,390 and 3,341 feet; perforated tubing and swabbed dry, set 30 minutes and then filled up 1,000 feet with sulfur water in 12 hours; swabbing.

In Richland County, Texas Co. No. 1 Pifer, SW SW SE Section 22-4n-10e, total depth 3,061 feet, acidized with 1,000 gallons, and reacidized with 4,000 gallons, swabbed 25 bbls., will put on the pump. Ohio Oil Co. No. 1 Fleming, C S half SW SE Section 15-4n-10e, pay at 2,986-3,003 feet and 3,001½-03 feet, coring ahead. Worthy E. Dyson No. 1 E. V. Wheeler, SW NE NE Section 24-4n-9e, shot with 20 quarts at 2,570-82 feet, filled to top with fluid in two hours, cleaned out to bottom; filled up 2,000 feet with fluid, still cleaning out. Leathers and others No. 1 Amos Yonaka, NW SE SW Section 22-2n-14w, drilling at 3,008 feet, Benoist topped at 2,860 feet and Aux Vases at 2,940 feet.

In Lawrence County, Rosenthal and others No. 1 W. Norton, C NW NW Section 17-4n-10w of second principal meridian, rigging up machine. M. G. Johnson No. 1 Downey, C E half SE NW Section 32-3n-11w, drilling at 2,425 feet.

In Madison County, L. C. Simmell and others No. 1 Mary Keller, NE NE SE Section 7-3n-8w, top of Devonian lime at 1,281 feet, total depth 1,367 feet, plugged back to 1,300 feet and ripped casing at 1,273-88 feet, acidized with 1,500 gallons, showing some gas and oil, running tubing to put on the pump.

In Marion County, Kingwood Oil Co. No. 1 Loomis, NE NE NE Section 31-3n-2e, drilling at 745 feet.

In Randolph County, R. T. Pendergast No. 1 Beattie, NW NW NE Section 14-5s-5w, moving in larger machine.

In Franklin County, Adams Oil & Gas Co. No. 1 Old Ben Coal Co., SW SW NE Section 19-5s-2e, drilling at 3,370 feet.

In White County, Shirley & Priest No. 1 Matilda How, NE NW SE Section 32-3s-14w of second principal meridian, drilling at 1,350 feet. Price & Massey No. 1 Sam Higginson, NW NW NE Section 22-4s-10e, drilling at 2,875 feet, Cypress topped at 2,765 feet, small oil showing at 2,824-26 feet.

In Bond County, Elmore and others No. 1 Felman, SW SE SW Section 13-6n-2w, drilling at 915 feet. Devonian Oil Co. No. 1 Ambuell, NE SW NW Section 22-6n-4w, shut down at 1,300 feet to make repairs. Kesl and others No. 1 Salthoff, NE NE NW Section 12-6n-5w, drilling at 920 feet.

In Fayette County, Shriner & Martin No. 1 Magnus, C SE SW Section 11-5n-2e, Weiler sand at 1,776 feet, shut down for orders at 1,817 feet. L. V. Garneer and others No. 1 Wade, NE NW SE Section 31-5n-4e, spudded and shut down.

In Gallatin County, Delta Drilling Co. No. 1 Stenson, SE SE SW Section 9-9s-9e, drilling at 2,265 feet, Golconda topped at 2,140 feet. Coates and others No. 1 Greene, SW cor. Section 16-9s-9e, shut down for orders at 2,710 feet.

Continental Supply Opens Its New Houston Plant

HOUSTON, Tex., Mar. 27.—Continental Supply Co. was host to oil men at the opening of its new $250,000 plant and warehouse here March 23. Visitors were welcomed by officials of this company and its parent company, Youngstown Sheet & Tube Co.

Representing Youngstown were Frank Purnell, president, and John W. Ford, director. Continental representatives were W. J. Morris, president; F. M. Mayer, vice president and treasurer; Frank Brinegar, vice president in charge of operations; D. D. Dellinger, assistant treasurer; W. G. Fitzpatrick, sales manager; A. J. Olson, chief engineer, all of Dallas; and F. H. Thrailkill, district manager, Houston.

Texas Corporation Issue Of $40,000,000

NEW YORK, Mar. 27.—Texas Corp. registration statement covering a $40,000,000 issue of "new money" debentures bearing 3 per cent interest and maturing on April 1, 1959, was received in Washington March 23 by the Securities and Exchange Commission. The net proceeds will be added to the general funds to increase working capital. No specific allocation has been made but they may be used for capital expenditures such as exploring, acquiring or developing reserves, improving, or replacing refining facilities and marketing facilities, or carrying inventories or receivables. Barco concession in Colombia represents one channel.

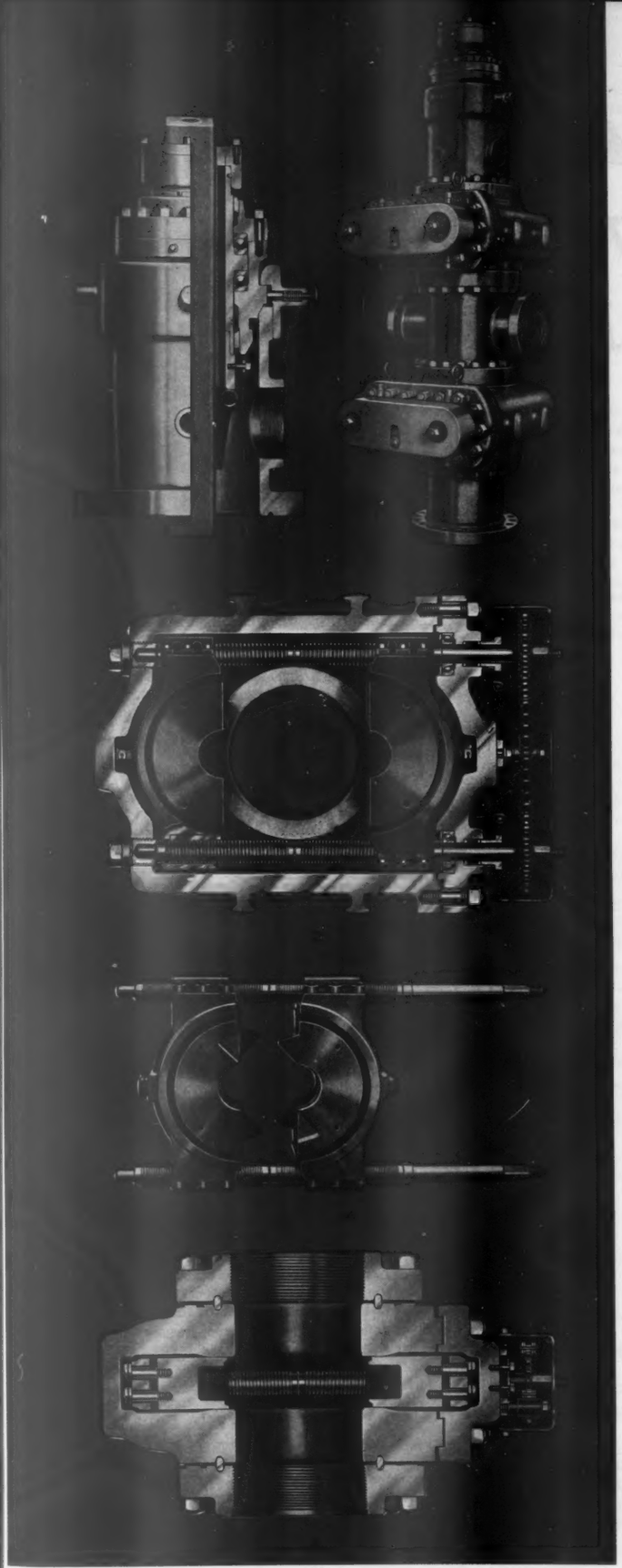
For *ten months* these MEEHANITE saddle castings in Chicago Bridge & Iron Company's Stress Relieving Furnace at Birmingham, Ala. have been withstanding *six hour heats at 1200° F.* with no signs of distress—evidence of real dependability.

WRITE FOR ANY OF THESE 10 FREE BULLETINS

Castings Advancement · Casting Design
Dies · Wear Resisting · Oil Industry
Machinery Castings · Specifications
Engineer Investigates Meehanite
Structure Micrographs · Pump Castings

● BUY FROM THESE LICENSED MANUFACTURERS

Farrel Birmingham Co.	Ansonia, Conn.
H. W. Butterworth & Sons Co.	Bethayres, Pa.
Kanawha Manufacturing Co.	Charleston, W. Va.
Ross-Meehan Foundries	Chattanooga, Tenn.
Greenlee Foundry Company	Chicago, Ill.
Cincinnati Grinders Incorporated	Cincinnati, Ohio
The Cincinnati Milling Machine Co.	Cincinnati, Ohio
Fulton Foundry & Machine Co.	Cleveland, Ohio
The Stearns-Roger Mfg. Co.	Denver, Colo.
Atlas Foundry Co.	Detroit, Mich.
General Foundry & Mfg. Company	Flint, Mich.
Hamilton Foundry & Machine Co.	Hamilton, Ohio
Barnett Foundry & Machine Co.	Irvington, N. J.
The International Meehanite Metal Co., Ltd.	London
Kinney Iron Works	Los Angeles, Calif.
Koehring Company	Milwaukee, Wis.
Cooper-Bessemer Corporation	Mt. Vernon, Ohio
Vulcan Foundry Company	Oakland, Calif.
E. Long, Ltd.	Orillia, Canada
M. H. Detrick Co.	Peoria, Ill., Newark, N. J.
Florence Pipe Foundry & Machine Co. (R. D. Wood Company, Selling Agents)	Philadelphia, Pa.
Warren Foundry & Pipe Corp.	Phillipsburg, N. J.
Meehanite Metal Corporation	Pittsburgh, Pa.
Rosedale Foundry & Machine Co.	Pittsburgh, Pa.
American Laundry Machinery Co.	Rochester, N. Y.
Banner Iron Works	St. Louis, Mo.
Valley Iron Works	St. Paul, Minn.
Australian Meehanite Metal Co., Ltd.	Waterloo, N. S. W.



Do You Know About This IMPROVED CONTROL EQUIPMENT?

Before you make any decisions about methods or equipment for high pressure drilling and control, it will pay you to learn all about the important new additions and improvements recently made in Shaffer "Safety First" Equipment.

1. Here is "pressure control equipment" at its best, with a Shaffer Combination Rotating Blow-Out Preventer and Stripper which provides positive protection at all times while drilling, running pipe in or out of the well, or when all the tools are out of the hole.

While drilling, the Stripper Rubber maintains a seal around the Kelly, and rotates with it. If gas pressure develops, the pressure automatically increases the sealing effect of the Stripper Rubber around the Kelly. Higher pressure serves only to develop a more positive seal.

When running-in or coming-out of the hole both the drill pipe and the tool joints are packed-off by the Stripper Rubber which expands and contracts to conform to the diameter of either the drill pipe or tool joints. The upper Shaffer Cellar Control Gate is provided with rams for packing-off around drill pipe and the lower gate with rams for a complete shut-off when the tools are out of the well.

2. Here is the latest and best in control equipment,—two of the new Shaffer Type 38 Cellar Control Gates and a Shaffer Combination Rotating Blow-Out Preventer and Stripper. Positive operation, safety against the highest pressures, and minimum overall dimensions are responsible for immediate acceptance by experienced operators.

3. This is the new Shaffer Type 38 Cellar Control Gate which seals against both the top and bottom inside faces of the gate body (as well as around the drill pipe) and has many other features which increase operating convenience and safety.

4. The new Shaffer Self Centering Rams are successfully used to center small diameter drill pipe in the bore of large diameter Shaffer Cellar Control Gates, and can be furnished for installation in any type of Shaffer Cellar Control Gates.

5. Sectional view of Shaffer Type 38 Cellar Control Gate shows details of assembly; also A.P.I. ring joint flanges to withstand extremely high pressures.

SEND FOR YOUR COPY OF THE NEW SHAFFER CATALOG

SHAFFER TOOL WORKS

BREA, CALIFORNIA
California Service Shops
Santa Fe Springs, Taft and Ventura

HOUSTON, TEXAS
6006 Navigation Blvd.

OKLAHOMA CITY, OKLA.
1534 S. E. 29th Street

EXPORT INQUIRIES should be directed to Shaffer Tool Works, Brea, California, U.S.A.

FOR SHAFFER FISHING TOOLS

IN OKLAHOMA
ACME OIL TOOL COMPANY
1001 S. E. 29th St.,
Oklahoma City, Okla.

IN TEXAS
WILSON SUPPLY COMPANY
1412 Maury Street
Houston, Texas

SHAFFER

HIGH PRESSURE DRILLING AND CONTROL EQUIPMENT
FISHING TOOLS THAT EXCEL

Described in detail on Pages 2009 to 2044 of the 1939 COMPOSITE CATALOG

North and East Texas

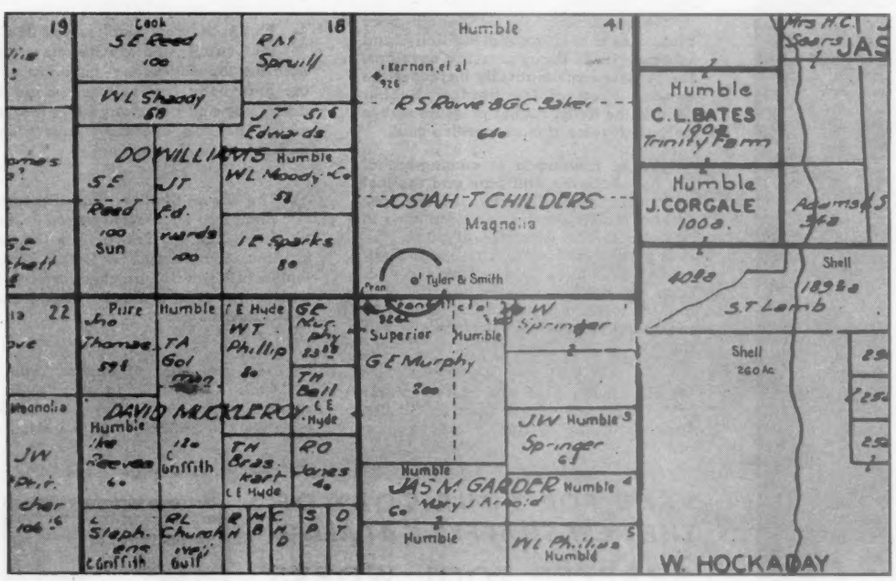
By
D. H. STORMONT

One New Well Completed in the World's Largest Oil Field

WICHITA FALLS, Tex., Mar. 27.—Staking of three new deep tests in Archer County, together with activity in Cooke County's Walnut Bend pool, featured the week's activity in the North Texas district.

Two new tests to the 4,300-foot horizon of northern Archer County and one test scheduled to be carried to 5,600 feet in the east central part of the county led the developments in the area. Helmerich & Payne, Inc., and United Producers Co., which jointly owned the south 200 acres of the Abner Nails Survey, Abstract 325, divided the tract into 20- and 40-acre tracts and each took 100 acres. The United Producers Co. staked location for No. 1 J. N. Shepherd, a rotary test, 330 feet from the north and 1,770 feet from the east line of the 200-acre tract. The test is a south offset to the Mazda Oil Co. No. 1 Finley, first 4,300-foot producer in the north extension area of the Hull-Silk pool. Helmerich & Payne, Inc., located No. 1 J. N. Shepherd, 330 feet from the south and west lines of the 200-acre tract. Both tests will begin operations at once.

The east central part of the county has been given a wildcat which will test all horizons down to and through the Strawn section of the Pennsylvanian formation. G. E. Kadane & Son (Kadane Oil Corp) has staked location for No. 1 Hemmie Estate, 466 feet from the north and east lines of Lot 60, Block 3, Clark and Plumb Survey, 3 miles south of Scotland. The wildcat is contracted to 5,600 feet and is located on a block of 2,000 acres. Drilling of the test is due to start by April 1.



Tyler & Smith and Richards & Holloway No. 1 Rowe & Baker, wildcat test in Henderson County, is indicating a new Mexia fault line field for the eastern Texas area

Cooke County

Addition of new territory on the southwest corner of the deep Walnut Bend Strawn sand pool of northern Cooke County was seen in the Sinclair Prairie Oil Co. No. 5 Best, Thomas Toby Survey. The well was bottomed at 4,956 feet in saturated oil sand, from 4,941 feet to total depth. Operator cemented 7-inch casing at 4,941 feet. On the north edge of the pool, Sinclair Prairie Oil Co. No. 6 Best was drilling below 3,801 feet, in shale. Machinery was being rigged up at No. 7 Best, 660 feet east of the discovery and at No. 8 Best, one location east of No. 4 Best, an oil well.

Also in Cooke County, western expansion of shallow production 2 miles north of Muenster is being sought by Trumpter Oil Co. in an outpost spudded in on the J. Paulter lands. While the pool is producing from the 770-foot horizon, operators will carry the outpost to a sand expected at about 960 feet. Location is in the Paulter 100-acre tract in the L. Mikel Survey, Abstract 747. Two miles south of Muenster, Whitfield, Pearson & Grimes have spudded and are drilling below 300 feet at a northwest outpost to the Voth pool, the first being the No. 3 Voth, W. W. Fulton Survey.

Clay County

Second 4,500-foot location for the new deep Strawn sand pool recently opened in Clay County, has been made. Shell Petroleum Corp. staked location for No. 1 W. A. Davis, 330 feet from the north and east lines of Block 93, J. H. Belcher Survey, and was preparing to move in materials for immediate drilling. L. T. Burns No. 1 A. L. Browning, Block 94, was officially completed last week for a daily potential of 1,348 bbls. of oil from Strawn sand at 4,432-61 feet. Burns is drilling a direct east offset to his discovery well. He recently bought more than 1,000 acres of royalty in the area, most of which was under offsetting acreage and under his own well.

Montague County

Another wildcat for Montague County, the third within two weeks, has been staked 6 miles north of the town of St. Jo. The new test is Seitz & Comegys, Ltd., No. 1 Guerin Estate, 1,025 feet from the east and 330 feet from the south lines of the R. H. Grimes Survey, Abstract 288. It is on a block of 1,000 acres, and several major companies in the area are reported to be contributing bottom-hole money.

A new southeast outpost to the recently opened Bonita Strawn sand pool has been staked by Continental Oil Co. and United Producers. The operators located No. 1 P. H. Braman in the northwest corner of the G. R. Jacques Survey, Abstract 393. The test is an east offset to their No. 1 Langford, Block 47, M.E. P.&P. Survey, which is showing for a producer, as a south offset to the discovery well.

Wise County

Two attempts to tap shallow oil production in Wise County are being made in wildcats nearing the projected pay zones. Roy Layton will test the 500-foot sand on the I. C. Morrow farm, Howard Ethridge Survey, and should the formation fail to pay off the hole will be deepened to the 1,500-foot horizon. Webb Gregg No. 1 D. Luttrell, Joseph Mitchum Survey, is drilling below 275 feet on a 600-foot contract. Considerable shallow exploration has been carried on in Wise County for the past few years, but not with any great amount of success.

EASTERN TEXAS

DALLAS, Tex., Mar. 27.—It is worthy of special mention that only one well was completed in the world's largest oil pool, East Texas, in the past week. With the final results of eastern Texas' indicated new oil pool still unknown, much speculation and a general increase in activity throughout the area was seen during the past week. Henderson County's new fault-line pool indicator, Tyler & Smith and Richards & Holloway No. 1 Rowe & Baker, appeared headed toward completion as a producer as the well kicked off under pumping tests to flow an estimated 25 bbls. in an hour and 10 minutes. The flow was into pits from a 2-inch line. Working pressure was around 100 pounds against 120 pounds closed-in pressure. At the end of the flow, output began to show a little basic sediment and possibly a little water. Operators were erecting storage as the week closed preparatory to taking an initial gauge as soon as the flow is free of sediment. Location is in the southwest corner of the J. T. Childers Survey and about 3½ miles northeast of the Flag Lake field.

Several miles northeast of this test and in the Gossett area of southern Kaufman County, Richards & Holloway No. 1 Tuggle, another fault-system test, was due to start coring for the Woodbine sand over the week-end. Last reported depth was 2,890 feet, in Austin chalk, topped at 2,591 feet. Considerable trading was seen during the week in the area of this and the previously mentioned possible pool opener. Some 2 miles from the tests leases are selling for $15 per acre while closer in royalty is going as high as $40 per acre.

Flag Lake Pool

Also in Henderson County and in the Flag Lake pool area, an extension of 1,000 feet to the south was given by completion of Texas Co. No. 1 Trinity Farms (E. P. Harwell) in the C. E. Miller Survey. The well flowed 163 bbls. on a 24-hour official gauge, one of the best producers in the field which now has 18 oil wells strung along the fault for a distance of 5 miles. Flow was through 12/64-inch choke with a gas-oil ratio of 590 to 1; casing pressure was 780 pounds and tubing pressure 380 pounds. Sand pay is at 2,999 feet to 3,006 feet, with casing cemented on top of the sand.

Wildcats Abandoned

Four of East Central Texas' closely watched wildcat tests were abandoned as failures. One each in Freestone, Houston, Red River, and Smith counties. Jack Frazier abandoned No. 1 F. Marberry, in the S. P. Flint Survey, 1½ miles northeast of the town of Kirvin, in Freestone County, at 3,836 feet, after topping

dry Woodbine sand at 3,818 feet. In Houston County, Humble Oil & Refining Co. abandoned No. 1 Mobley at 5,958 feet, after topping water in the Woodbine sand at 5,878 feet. The test was located in the J. L. Riviere Survey. Red River County lost its Bentley-Sheppard No. 1 Southern Pine Lumber Co. at a total depth of 1,847 feet. The Paleozoic formation was topped at 1,810 feet. The test was located in the G. S. Parks Survey, about 17 miles north of the town of Clarksville. Two miles west of Mount Sylvan in Smith County, R. W. Fair abandoned his No. 1 Clark, J. Lewis Survey, at a total depth of 5,388 feet after topping dry Woodbine sand at 5,263 feet.

New Locations

Three new wildcat locations were staked in the East Central Texas area to hold the list of active exploratory tests as its past four weeks' level. Anderson County received a new wildcat when John G. Mayo and the Cook Drilling Co. staked location for their No. 1 Southern Pine Lumber Co., located in R. Erwin Survey, 2 miles west of the town of Slocum. Derrick has been built and operators are rigging up materials.

In Navarro County, W. H. Strong located his No. 1 Emma Jackson in the J. McNeal Survey, 10 miles south of Corsicana. The test has been spudded and is drilling below 45 feet.

In Cherokee County, B. H. McMahon of Palestine was reported to have assembled 1,000 acres of a proposed 5,000-acre block in the Atoy area, about 10 miles east of Rusk. The operator plans a test after the completion of his 5,000-acre block.

EAST TEXAS FIELD COMPLETIONS

(One-hour gauge)

Gregg County—Kilgore Area

Potter Brothers No. 1 Blackstone Cafe, 3,543-63 feet, 45 bbls.

EAST CENTRAL TEXAS COMPLETIONS

(24-hour gauges)

Anderson County

F.H.E. Oil Co. No. 1 City of Palestine, 5,341-53 feet, 60 bbls.

Freestone County

Jack Frazier No. 1 Marberry, dry and abandoned at 3,836 feet.

Houston County

Humble Oil & Refining Co. No. 1 Mobley, dry and abandoned at 5,958 feet.

Red River County

Bentley-Sheppard No. 1 Southern Pine Lumber Co., dry and abandoned at 1,847 feet.

Smith County

R. W. Fair No. 1 A. D. Clark, dry and abandoned at 5,388 feet.

NORTH TEXAS COMPLETIONS

Archer County

Bridwell Oil Co. No. 1 V. F. Veitenheimer, 1,117 feet, dry. L. T. Burns No. 6 J. D. Carpenter, 1,838 feet, dry. L. T. Burns No. 1 Mrs. M. I. Thomas, 1,132 feet, dry. Continental Oil Co. No. 4 A. J. DeMoss, 1,253 feet, dry. Fresno Oil Co. No. 1 V. D. Powell, 1,027-31 feet, 10 bbls.; No. 2 V. D. Powell, 1,321 feet, dry. A. Horwitz No. 11 S. M. J. Benson, 919-34 feet, 8 bbls. Rathke Oil Co. No. 4 C. Cowan, 1,125-33 feet, 100 bbls. Rathke Oil Co. No. 5 C. Cowan, 1,222-29 feet, 30 bbls.

Clay County

Duncan and others No. 7 T. P. Duncan, 1,185-1,209 feet, 77 bbls. Metzner & Burns No. 27 L. Thornberry, 205-10 feet, 2 bbls.

Cooke County

B. F. Thompson No. 2 Joe Wiesman, 893-915 feet, 65 bbls.

Wichita County

M. Stainforth No. 1 J. Jennie, 1,253 feet, dry. Panhandle Refining Co. No. 14 Reilly Griffin, 1,866 feet, dry; No. 16, 9-A, 10-A, Reilly Griffin, abandoned locations. W. H. Peckham No. 4 Munger, 3,800-85 feet, 895 bbls. George B. Ray No. 1 Sue Mitchell S, 494-517 feet, 10 bbls. S. E. Marchand No. 20 H. Willis, 100-12 feet, 2 bbls. M. Stainforth No. 1 S. George, 1,361-70 feet, 30 bbls. Consolidated Oil Co. No. 20 W. P. Ferguson, 3,667-3,783 feet, 1,100 bbls. G. W. Cooper No. 54 J. L. and T. J. Waggoner, 3,735-3,900 feet, 360 bbls. Deep Oil Development Co. No. 21 Munger, 3,697-3,855 feet, 400 bbls. W. B. Hamilton No. 5 Martin, dry and abandoned at 566 feet. Hawkins No. 7 Dobie, 425-30 feet, 2 bbls. King Oil Co. No. 7 Waggoner, 1,604-20 feet, 145 bbls.

Young County

Cable Oil Co. No. 44 A. Snider, abandoned location. H. Craig No. 1 R. L. Morrison, 1,126 feet, dry. Head and others No. 1 T. J. Routon, 795 feet, dry. Charles B. King No. 1 G. P. Stewart, 875 feet, dry. Kriss and others No. 1 C. E. Howard, 740 feet, dry. Langille and others No. 1 T. F. Harman, 569-90 feet, 8 bbls. R. T. Parkin and others No. 1 A. W. Hardy, 701 feet, dry. Pitzer West and others No. 4 T. J. Gardner, 4,000-25 feet, 550 bbls. D. W. Power No. 1 J. F. Larimore, 559-70 feet, 10 bbls. Seiboldt Drilling Co. No. 2 E. M. Wolf, 3,962-96 feet, 554 bbls. Stuckey Oil & Gas Co. No. 1 Roy Laird, 932 feet, dry.

New York-Penna. Gas Fields

(Continued from Page 199)

State Natural Gas Co. is drilling at 5,056 feet on the F. McCarthy farm; Sylvania Corp., at 3,700 feet on the No. 2 Harrison; New York State Natural Gas Co., at 1,485 feet on the Ladd estate and Updegraff at 798 feet on the Norman Patterson. Evjen, Harris and others remain shut down at 3,010 feet on the A. R. Mitchell farm in Sweden Township and G. L. Cabot, Inc., is drilling at 5,460 feet on the William Cobb farm in Allegany Township.

Sylvania Corp. completed another Woodhull field well last week when its well on the Della Calhoun farm was completed at 4,167 feet with an initial of 1,141,000 cu. ft. per day. Top of the Oriskany was at 4,148 feet.

New York State Natural Gas Co. drilled through the Tully at 3,322-68 feet on the William Preece farm, Cameron Township, and was down to 3,370 feet in the deepest of the tests in this new area. In others, Belmont Quadrangle Drilling Co. is drilling at 890 feet on the Andrew Taft farm; New Penn Development Co., at 340 feet on the Sylvia Allen.

YOUR CREWS WILL LIKE THIS BETTER LINING...

the NEW
J-M 420
ASBESTOS "CABLES" form the backbone of J-M 420 Rotary Lining. Woven into a compact mass, impregnated and compressed, they make a remarkably efficient and durable lining for heavy-duty work.

IF you've used J-M Rotary Linings . . . and most producers have . . . you know they give smooth, sure braking for a long time at low cost. But here's a *new* J-M Rotary Lining that gives even better service. It's made from an improved weave of "cabled" asbestos yarn, impregnated to increase heat resistance and frictional qualities, and it has these important advantages:—

UNUSUALLY EVEN FEED-OFF, giving better control of drilling . . .

HIGHER BRAKING EFFICIENCY, even at extreme temperatures caused by heavy loads . . .

LONGER LIFE under any conditions . . .

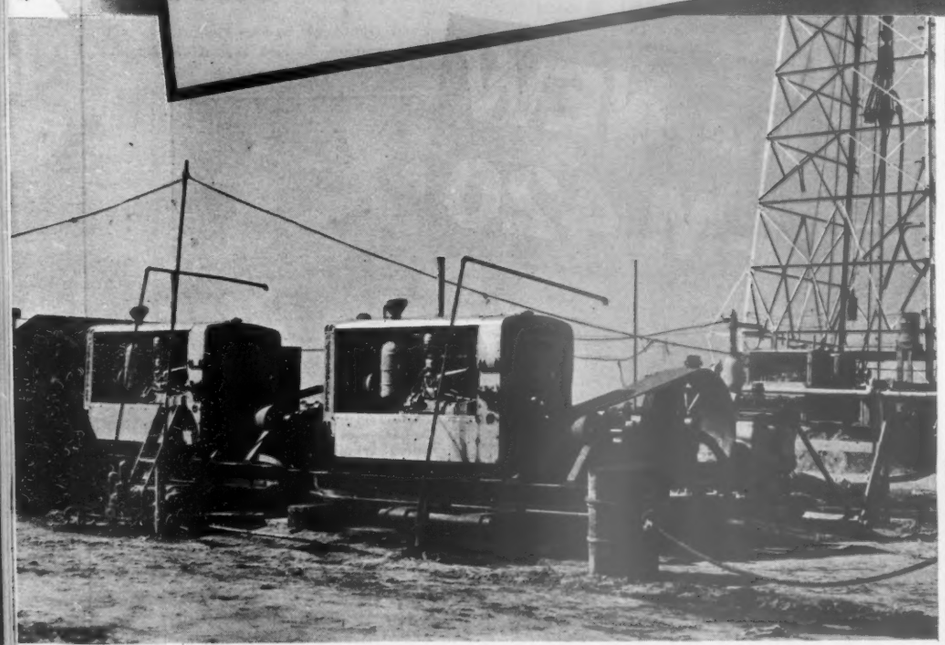
LESS SCORING of drums, giving longer drum life.

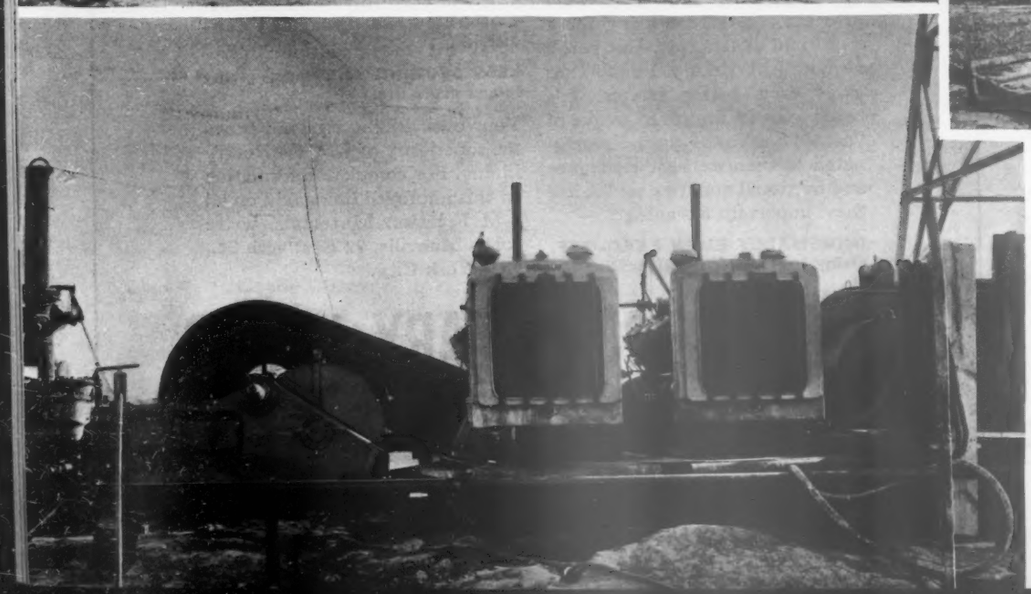
Your own drilling rigs will prove the superiority of J-M 420 Rotary Lining. For complete information on this improved lining and on all J-M Friction Materials, write Johns-Manville, 22 East 40th St., New York City.

JM JOHNS-MANVILLE 420 ROTARY LINING

The whistle *never* blows FOR THESE CATERPILLAR DIESELS!

REG. U.S. PAT. OFF.

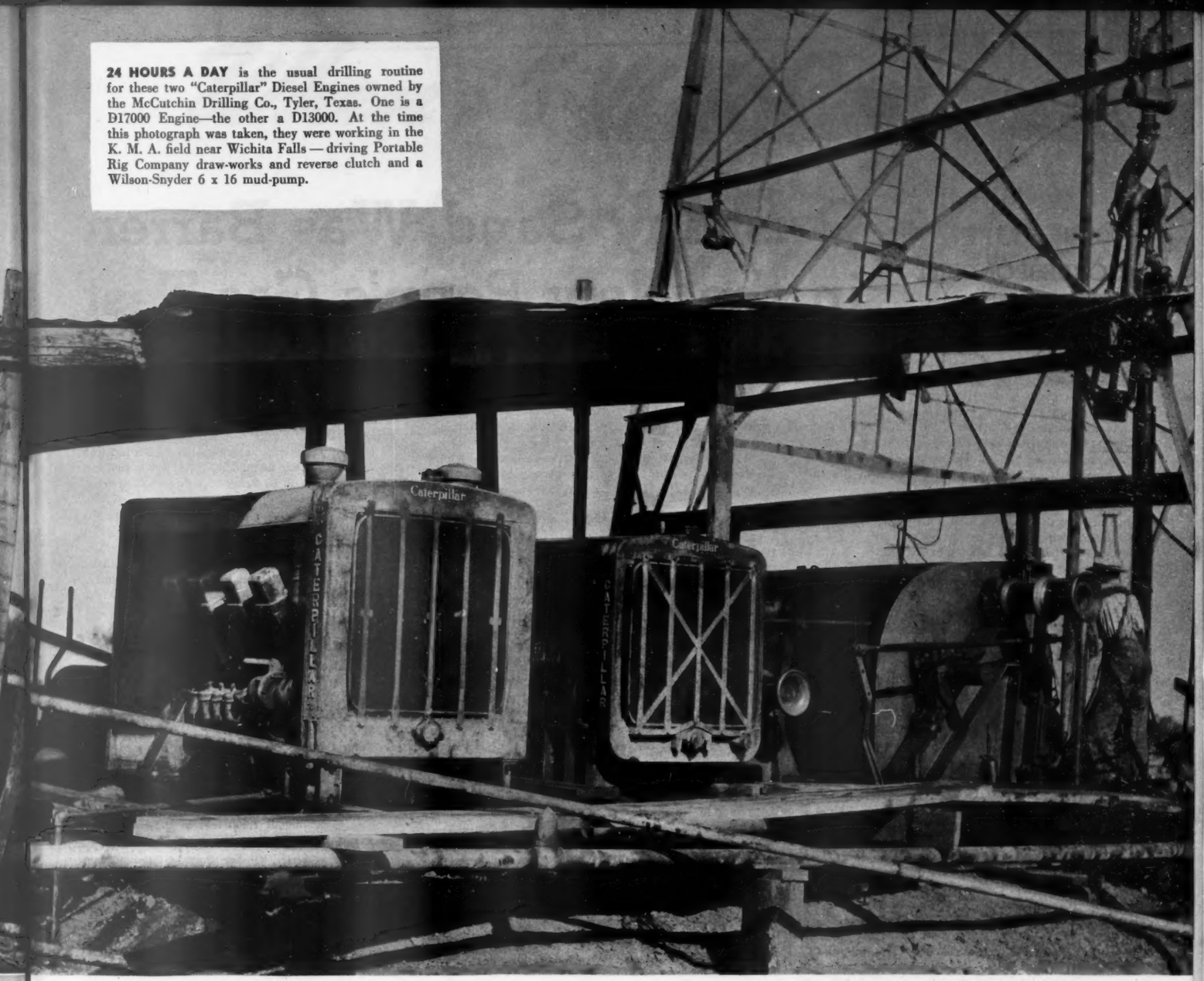




24 HOURS A DAY driving a Wilson Giant Rig and 6 x 16 Wilson-Snyder mud-pump! These two "Caterpillar" Diesel D13000 Engines are owned by the M. & L. Drilling Co., Wichita Falls, Texas. Working in the K. M. A. field when this picture was taken.

24 HOURS A DAY is the schedule for these four "Caterpillar" Diesel D13000 Engines working in southern Illinois. Two drive Wilson-Snyder mud-pumps, and two power the Wilson Portable rotary rig. The owner—Lupher Drilling Co., Columbus, Ohio—has four more "Caterpillar" Diesels!

24 HOURS A DAY driving this Bridgeport rig with Gardner-Denver 7¼ x 14 mud-pump. Average fuel-consumption for each engine: 6 gallons of 8-cent fuel per hour. Both of these "Caterpillar" Diesel Engines are D17000s. Owned by Schoenfeld, Hunter, Kitch, Centralia, Illinois.



24 HOURS A DAY is the usual drilling routine for these two "Caterpillar" Diesel Engines owned by the McCutchin Drilling Co., Tyler, Texas. One is a D17000 Engine—the other a D13000. At the time this photograph was taken, they were working in the K. M. A. field near Wichita Falls — driving Portable Rig Company draw-works and reverse clutch and a Wilson-Snyder 6 x 16 mud-pump.

HERE are four owners of "Caterpillar" Diesels who don't figure on knocking-off until their jobs are done. When they start their engines rolling, *they keep them rolling* — twenty-four hours a day if necessary!

You've got to have stamina and dependability to bear down like that. And that's the same as saying: You've got to have the *correct design* and *quality construction* that go into a precision-built "Caterpillar" Diesel!

If these engines offered nothing more, those two things, alone, would be reason enough for their widespread use in the world's oil-fields. But in addition to being able to stay with a job to the end, they've got *sufficient power* to handle any equipment — and to conquer any kind of going!

Then, there's something more. With their outstanding fuel-economy, they *cut* the cost-per-foot when you drill . . . *lower* the cost-per-gallon when you pump . . . *reduce* the expense of servicing wells. And the world's most complete and widely available engine-parts-and-service facilities stand back of their continuous economical performance!

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS
NINE ENGINE SIZES — 32 TO 160 HORSEPOWER

CATERPILLAR
REG. U.S. PAT. OFF.
DIESEL POWER

DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY

Eastern Field Report

By STAFF CORRESPONDENT

Oriskany Sand Was Barren in the New Penn's Gas Test

PITTSBURGH, Pa., Mar. 27.—The test of the New Penn Development Co., William E. Snee and others on the Indian Creek Coal & Coke Co. tract on Chestnut Ridge, South Union Township, Fayette County, Pennsylvania, topped the Oriskany sand at 7,103 feet and at 7,118 feet there was no increase in the gas volume, proving that section of the Oriskany dry. There is a volume of about 900,000 cu. ft. a day from the chert beds in the Onondaga lime. The hole is still being deepened to explore the remaining section and is drilling in hard dark cherty lime with practically no sand grains showing.

In Southeast Ohio Atha Oil Co. on the J. McCullough heirs farm in Section 17, Madison Township, Perry County, completed a well in the Clinton sand at 3,060 feet, producing about 35 bbls. a day with 175,000 cu. ft. of gas. This well is only 2 feet in the sand and will not be deepened nor shot at present.

SOUTHWEST PENNSYLVANIA

In Southwest Pennsylvania, Washington Township, Greene County, Equitable Gas Co. is hauling rig for No. 3 John Huffman. In Center Township, this company is moving in to deepen No. 1 I. J. Clutter from 1,988 feet. In Jackson Township, this company started deepening a well on the H. E. Chaney farm from 2,273 feet.

In Morris Township, C. H. McVay has reached 3,065 feet on the Elmas Laughman farm. O. I. Dille and others are drilling at 2,070 feet in the second test on the Ellsworth Beckham farm.

In Richhill Township, Burleigh Wright has started drilling on the Strawn heirs farm and is deepening the test on the William McVay farm, starting at 3,292 feet. In Franklin Township, Greene County, J. B. Myers and others are drilling at 2,260 feet on the Sallie Morris farm.

In Washington County, Manufacturers Light & Heat Co. is rigging up No. 4 R. W. Parkinson in Morris Township. In Amwell Township, A. V. Lewis and others reached 300 feet in No. 2 William Dodd and is shut down.

In Fayette County, Nollem Oil & Gas Co. has reached 925 feet on the Andy Manyak farm in Mennallen Township and should reach the Big Injun sand within the week. Considerably more drilling is expected in this area.

Deep Tests

In Armstrong County, the Peoples Natural Gas Co. is drilling at 2,515 feet on the Lowry Martin farm in Wayne Township.

WEST VIRGINIA

In Calhoun County, West Virginia, South Penn Oil Co. completed No. 4 Henry Brannon in Sherman district in Big lime at 2,150 feet, and it is showing 6 bbls. a day after a shot, which did not increase the flow. It may be acidized.

In Gilmer County, Hope Natural Gas Co. completed No. 1 M. D. Allman in Truy district in Gantz sand at 2,402 feet, and it is good for 2 bbls. a day.

Gas Wells

In Cabell County, the West Virginia Gas Corp. completed a gas well on the Claude Keyser farm in McComas district at 3,335 feet. It had Brown shale at 2,845-3,320 feet and 425,000 cu. ft. a day after a shot. In this district, Wade Gas Co. completed a gas well on the Nelson Holton heirs land at 3,605 feet. It had Brown shale at 2,936-3,595 feet, and gauged 160,000 cu. ft. a day after a shot.

In Calhoun County, Gunn, Gainer & Gunn completed a gas well on the Luerna Barr farm in Sherman district at 1,875 feet, gas gauging 212,000 cu. ft. a day before a shot from sand at 1,833-50 feet.

In Lincoln County, Harvard Gas Co. completed No. 6 Lincoln Mineral Co. in Washington district at 3,666 feet, with the Brown shale at 3,475-3,666 feet and a production of 80,000 cu. ft. a day.

In Wirt County, the Shore Oil Co. drilled No. 4 on the Laura M. Mayle farm in Clay district through the Injun sand to 1,801 feet and it was dry and abandoned.

Oriskany Gas Field

In the Oriskany gas field in Kanawha County, the United Fuel Gas Co. is completing No. 4823 on the G. C. Patterson and others lease in Poca district with the Oriskany topped at 4,959 feet and 6,500,000 cu. ft. a day showing at 4,970 feet. In this district, Godfrey L. Cabot, Inc., is completing the test on the Helen M. Hoge farm with the Oriskany topped at 5,099 feet and a volume of 5,700,000 cu. ft. a day showing at 5,021 feet. Both wells will be deepened.

In Union district, Kanawha County, M. C. Allen made a location on the Solon Fletcher farm, elevation 578 feet; Ajax Gas Co. is drilling at 750 feet in the Clyde Anderson and others test and has a location for a test on the Perry Marks farm.

Poca District

In Poca district, United Fuel Gas Co. is drilling at 5,019 feet in No. 4822 W. F. Beane; at 1,891 feet in No. 4769 O. R. Schmittauer; at 1,864 feet in No. 4814 W. F. Beane; at 4,972 feet in No. 4817 W. M. Vance; at 3,900 feet in No. 4825 W. P. Tolbert and others; at 2,771 feet in No. 4826 Janey Gibson and others; at 3,450 feet in No. 4927 O. D. Price and others; at 4,015 feet in No. 4828 M. R. Mairs; at 1,285 feet in No. 4,831 C. O. Slater and others.

In this district, the United Carbon Co. has reached 1,090 feet on the A. H. Campbell farm and has rig up for the D. D. Slater and others test. West Virginia Gas Corp. is drilling at 1,796 feet in the W. H. and T. E. Reese test. The Hays Oil & Gas Co. has rig completed for the J. A. Wilkinson test and Columbian Carbon Co. is drilling at 4,480 feet in the L. M. Fields and others test.

In Elk district, this company has reached 4,655 feet on the M. N. Landers and others farm. The Poca Fork Oil & Gas Co. is drilling at 350 feet on its own property.

Deep Tests

In Jackson County, the test of Joe Rubin, Norwood P. Johnston and others on the D. P. Curry farm in Ravenswood district topped the Corniferous lime at 4,601 feet, somewhat lower than expected, and is shut down at 4,623½ feet to run casing. This is running higher on the lime than the test of W. H. Petry on the D. O. Curry farm which had an elevation of 615 feet, with the Corniferous at 4,600 feet and the Oriskany at 4,698 feet. In this test there was gas in the Oriskany but at 4,716 feet the small hole was plugged with a fishing job.

In Ripley district, Jackson County, the Columbian Carbon Co. topped Berea at 2,486 feet on the G. W. Lathey farm and shut down at 2,511 feet to run casing as the Berea carried water. In this district, Everett Starcher and others are drilling at 4,964 feet on the R. R. Boggess farm, and at 800 feet on the Grady F. Boggess farm. Both are extensions of the Elk-Poca field in Kanawha County. In Washington district the United Carbon Co. is hauling in rig for No. 4 Elizabeth Ward Perkins.

In Pleasants County, Columbian Carbon Co. pulled the 6⅝-inch casing in the test on the Giles Hammat farm in Grant district and ran 7-inch to 4,770 feet. An open hole will be carried to the Corniferous lime.

New Work

In Cabell County, United Fuel Gas Co. made a location on the Manville Adkins heirs in McComas district, elevation 1,060 feet. In this district, the Elkins Gas Co. is down 115 feet on the Leonard Paugh farm. The Bowen Gas Co. is moving in material for a second test on the W. S. Childers farm. R. H. Adkins is drilling at 1,500 feet in the B. L. Perry test. In Grant district, Big Two Mile Gas Co. is down 2,700 feet in the W. W. Connor test. J. W. Wilson and others are rigging up on the William H. Birch farm.

In Braxton County, Pittsburgh & West Virginia Gas Co. made a location on the Ed LL. Boggs farm in Birch district, elevation 1,025.1 feet. In Clay County, this company will drill No. 7666 on the W. M. Duffield farm in Otter district, elevation 1,048.5 feet.

Calhoun County

In Calhoun County, McIntosh & Grim made a location for a test on the John R. Lockney farm, Sherman district, elevation 1,204.94 feet. In Washington district, the Four-Way Oil Co. will test the L. C. Harris farm, elevation 1,001 feet.

In Gilmer County, Toney Elliott and Leonard Cain will drill on the Scott Williams farm in DaKalb district, elevation 815 feet. The McCall Drilling Co. has a location for No. 2 J. H. Houghton and William Stalnaker heirs, elevation 1,135 feet. In this district Paul K. Weekley is drilling at 1,000 feet in the Stern and Turner test.

In Glenville district, Gilmer County, E. L. Bush will drill on the Moda Parker farm, elevation 760 feet. Pittsburgh & West Virginia Gas Co. will drill No. 7670 on the E. D. Fulton farm. In the same district, this company is drilling at 1,273 feet in No. 7665 A. L. Cottrill.

In Harrison County, Eagle Gas Co. will drill on the Bethel Hildreth farm in Eagle district, elevation 1,147.89 feet. In Lewis County, Pittsburgh & West Virginia Gas Co. is down 1,273 feet in No. 7653 L. C. Waugh.

In Lincoln County, the Sweetland Land & Mining Co. is moving in on the J. J. Smith farm, Union district. Big Laurel Gas Co. is drilling at 975 feet on the Callaway Plumley farm. In Duval district, Kanawha Gas & Utilities Co. is mandrilling after the casing collapsed from a shot in the No. 2 Edward Davis. In Jefferson district, the Left Fork Oil & Gas Co. is hauling material for a test on the Lucinda Lovejoy farm.

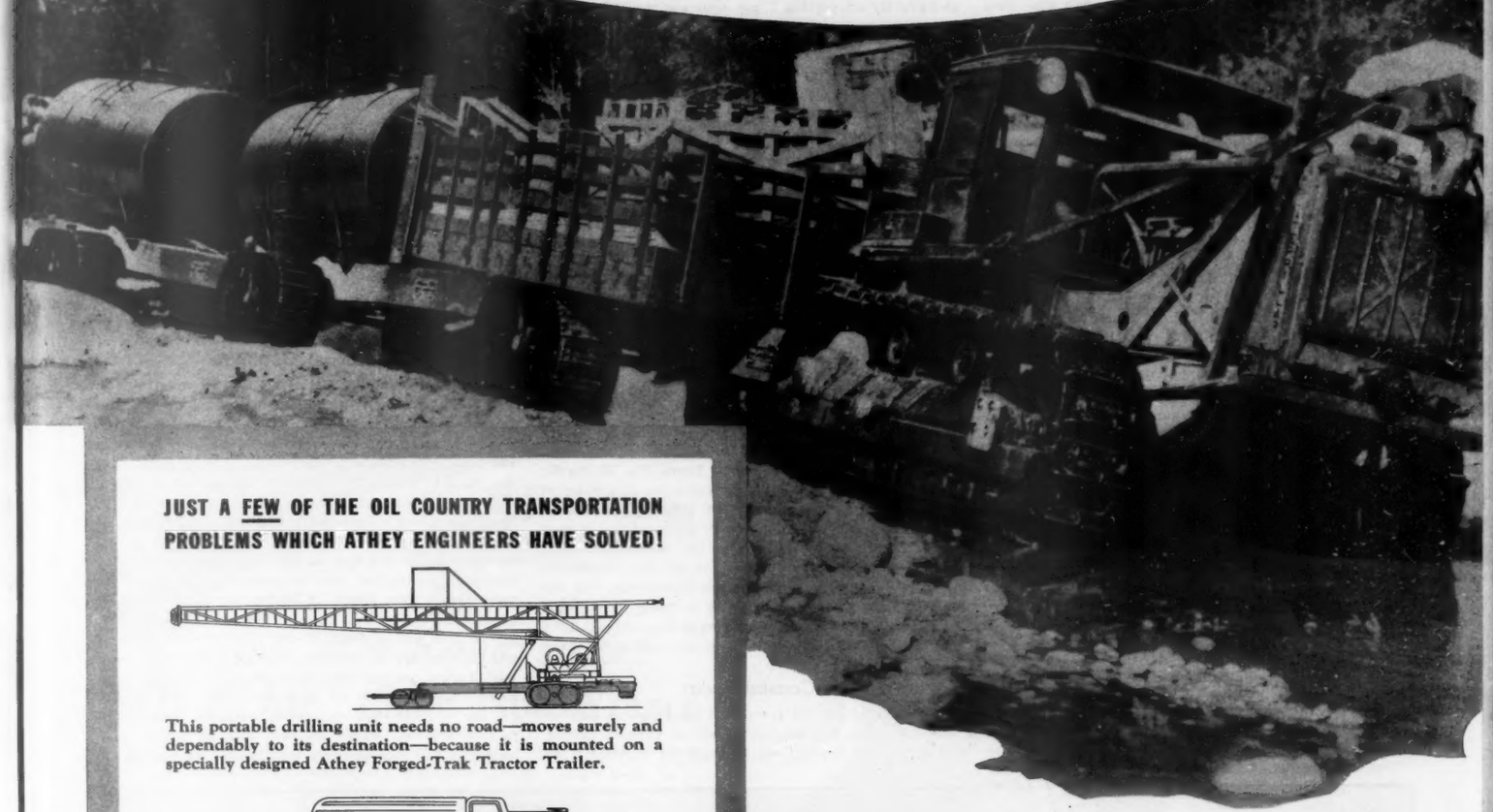
In Pleasants County, Watson Oil & Gas Co. has a rig up for No. 11 F. M. Lamp in Lafayette district. In Ritchie County, J. L. Davis has a location on the L. C. Stephens farm in Grant district, elevation 825.7 feet.

In Roane County, the Rodgers Properties Co. made a location on the O. P. Ball farm in Curtis district, elevation 852.81 feet. In Harper district, O. H. Reed and others has part of the material for a second test on the M. J. Hughes and others land. James Kust and Joseph Fields will drill on the C. E. Jones farm, same district. R. W. Healey has a rig standing on the G. N. Gandee farm.

In Wayne County, Russell J. Petrie made a location on the G. W. Ramey farm in Ceredo district, elevation 675 feet. In Butler district, Chartiers Oil Co. is rigging up the I. J. and Wilson Buskirk test. In Union district, R. H. Adkins and others are drilling at 2,829 feet on the C. Cyrus farm with a showing of 30,000 cu. ft. of gas.

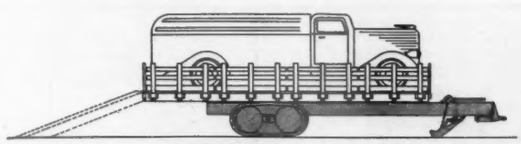
In Wetzel County, Pittsburgh & West Virginia Gas Co. made a location for No. 3 Nellie Morgan, Grant district, elevation 1,148 feet. In Proctor district, Bush & Ferrell have a rig up on the Joseph Sivert heirs farm.

When it's YOUR move ...make it OUR problem

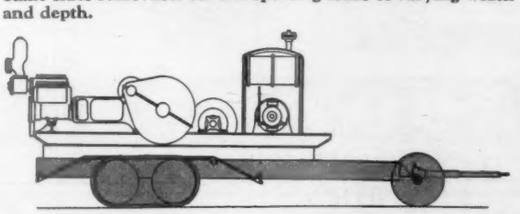


JUST A FEW OF THE OIL COUNTRY TRANSPORTATION PROBLEMS WHICH ATHEY ENGINEERS HAVE SOLVED!

This portable drilling unit needs no road—moves surely and dependably to its destination—because it is mounted on a specially designed Athey Forged-Trak Tractor Trailer.



A specially constructed Athey Forged-Trak Stake Platform Trailer—designed as a general utility unit, and used here for carrying loaded motor trucks over soft or marshy ground. Stake sides removable for transporting loads of varying width and depth.



Large slush pumps often present a difficult transportation problem—but one that is perfectly solved by Athey Forged-Trak units like this. Pump mounted on skids which are removable from the wagon.

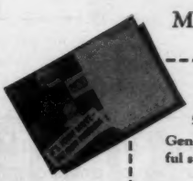
IF YOU have a problem of moving big, heavy, bulky loads *without delay*—and regardless of bad ground conditions—consult with Athey! We've solved many a transportation problem for oil country engineers . . . have helped them find quicker, easier, lower-cost moving methods. Years of experience in designing and building equipment for oil country use in connection with "Caterpillar" Tractors have given Athey a unique background for this work. Let us give your problem INDIVIDUAL attention—at no cost or obligation on your part. Write us!

ATHEY TRUSS WHEEL CO.

5631 West 65th Street, CHICAGO, ILLINOIS

Cable Address: **"Trusswheel," Chicago**

Mail the coupon for this helpful, free booklet



ATHEY TRUSS WHEEL CO.
5631 West 65th Street, Chicago, Illinois

Gentlemen: Please send me a copy of your free booklet containing helpful suggestions on solving oil country transportation problems.

Name.....

Address.....

City..... State.....

See Your "Caterpillar" Dealer

ATHEY

FORGED-TRAK OIL FIELD WAGONS AND TRAILERS

California Field Report

By
L. P. STOCKMAN

Torrance Leads in New Wells With 5 Completions in Week

LOS ANGELES, Calif., Mar. 27.—The Torrance field headed the completion list this week with five new wells that showed an aggregate initial production of 3,087 bbls. In the Walnut section of the field three good wells were completed near 240th and Walnut streets and several others are nearing completion. The new wells were Ray Wilson No. 3 Lomita, flowing 740 bbls. per day; Alford Oil Co. No. 14 Lomita, flowing 690 bbls. daily, and Golden Bear Oil Co. No. 1 Geomarey, flowing 635 bbls. per day. Ray Wilson No. 3 Lomita, bottomed at 5,190 feet and finished with a 7-inch water string landed at 4,843 feet, was brought in flowing through a 40/64-inch bean, tubing pressure 350 pounds and casing pressure 400 pounds. The cut is running around 3.5 per cent but may clean up a little after the well has been on production for several days. Alford Oil Co. No. 14 Lomita was bottomed in the pay at 5,187 feet, and finished with a 7-inch water string cemented at 4,788 feet and the usual liner and tubing. It was brought in flowing through a 36/64-inch bean and the oil was very clean. Golden Bear No. 1 Geomarey, bottomed at 5,171 feet, flowed through a 28/64-inch bean, tubing and casing pressures of 180 pounds and 450 pounds respectively. It is producing clean oil.

The relatively large initials shown by new wells in the Torrance field are not maintained for any length of time as operators have found that all wells must be beaned back in order to prevent water from increasing and to increase the flowing life of the well. Not much natural gas is produced by deep zone wells in the Torrance field, so it is advantageous to resist the flow of gas in order to increase crude oil production. Failure to recognize this factor during the early stages of development in the Lomita section of the Torrance field last year substantially reduced production and will make it impossible for many wells to pay out. Garner-Johnson Oil Co. which took over the Cuba Oil Co. No. 2 Bush recently completed the well flowing 830 bbls. of clean 26.1-gravity oil per day from the deep zone at 5,175 feet. Critton & Colvin No. 1 Clarke located at 237th and Eshelman streets was good for 192 bbls. of 26.5-gravity oil cutting 2 per cent per day from 5,168 feet.

Wilmington

Two small wells were completed in the Wilmington field of Los Angeles Basin. Long Beach Oil Development Co., composed of Standard Oil Co., Hancock Oil Co., Signal Oil & Gas Co. and A. N. Macrate, has staked location for 12 tideland wells to be drilled in the immediate future. This is the first group of from 75 to 90 new wells which this company is obliged to drill on a tideland lease secured from the Long Beach Harbor Commission on a high royalty basis. This contract means that a minimum of 150 wells will be drilled into the tideland accumulation as the Signal Oil & Gas Co. is at present working on a contract awarded several months ago calling for about 75 wells located adjacent to the various ship channels.

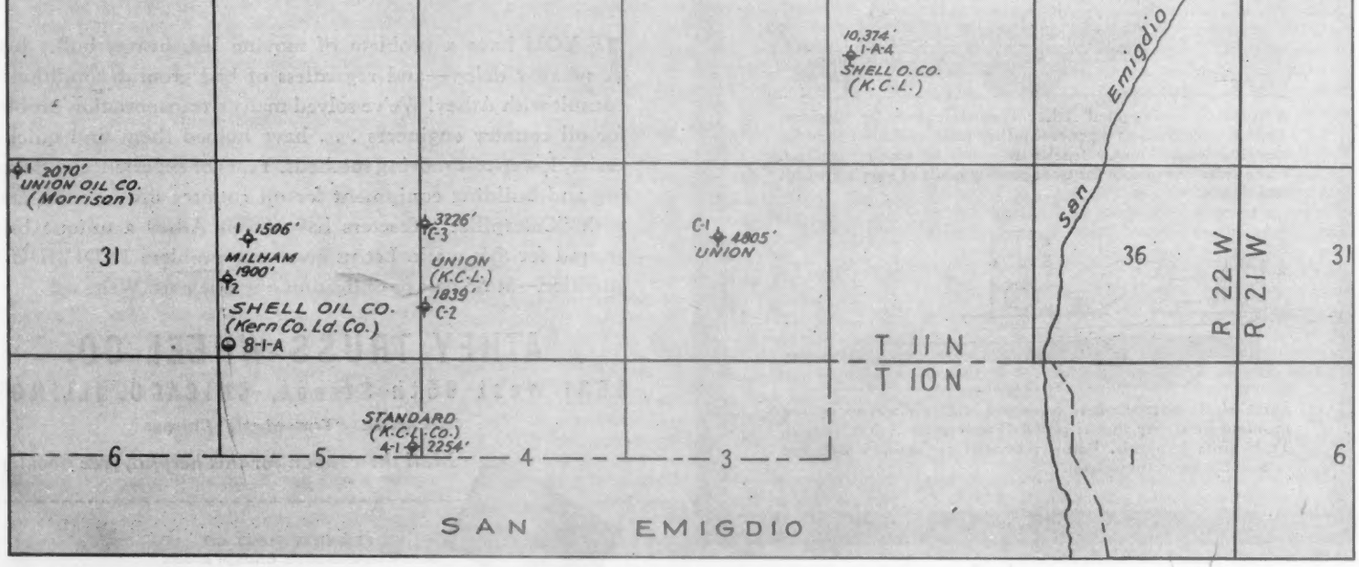
The new wells completed in the Wilmington field were Bond Petroleum Co. No. 2 Mutual and Richfield Oil Corp. No. 25 Pacific Dock. The former was finished at 3,230 feet. It proved to be good for 285 bbls. of relatively clean 17.5-gravity oil per day from the Ranger zone. Richfield Oil Corp. No. 25 Pacific Dock was bottomed in the Ranger zone at 2,996 feet and was completed flowing 290 bbls. of clean 19.4-gravity oil per day. Union Pacific Railroad Co., largest holder of productive acreage in the Wilmington field has concluded drilling operations on No. 101 Offset at 3,290 feet and is swabbing for production, but the well has not yet responded with a steady flow. This company has also finished drilling No. 107 at 3,998 feet and should have it tanking oil within the next 24 hours.

Coastal Area

Continental Oil Co. completed an excellent producing well in the San Miguelito field of Ventura County when No. 10 Grubb was brought in flowing 2,684 bbls. of clean 32.6-gravity oil and 4,250,000 cu. ft. of natural gas per day through two 1-inch beans and a 48/64-inch bean. The crew was moved to No. 11 Grubb and preparations started to begin early work. In Santa Barbara County, Richfield Oil Corp. has staked locaton for No. 1 Marcos which will be drilled in the Sisquoc district. Gerard & Thompson have completed drilling No. 1 Berneiser in Section 27-10-34 in the Santa Maria Valley field and should be ready for an early production test. In the Gato Ridge field of Santa Barbara County, the Petrol Corp. is preparing to begin drilling No. 32-A Tognazzini in Section 36-9-32 and Barnsdall Oil Co. is rigging up to pump No. 5 Magenheimer in Section 9-8-32 following conclusion of drilling operations at 4,385 feet. In the Los Olivos district, General Petroleum Corp. has reached a depth of 3,160 feet but this wildcat is still going ahead.

Southeast Coalinga

Petseahon completed No. 35-7-F in Section 7-20-16 in the Southeast Coalinga field of Fresno County and the same group, consisting of the stockholders of the now liquidated Petroleum Securities Co. and Seaboard Oil Co. and Honolulu Oil Corp., should have well No. 22-18-F in Section 18-20-16 tanking oil within a few days. Petseahon's new completion, No. 35-7-F, has been given a nominal initial daily production of 3,500 bbls. of clean 32.3-gravity oil and 700,000 cu. ft. of natural gas per day as the well was not given a potential production test or allowed to produce for more than a few hours. It logged top of the Gatchell zone at 6,833 feet and base of the zone at 7,326 feet, giving the well a total of 493 feet of rich oil sand and was brought in flowing through a 7/64-inch bean with bottom of the hole at 7,328 feet. Shut-in pressure is 1,175 pounds on the tubing and 1,400 pounds on the casing. The hole was finished with 6,779 feet of 9⅝-inch water and 575 feet of 7-inch liner including 540 feet of perforated landed on bottom. A



Shell Oil Co. is drilling a wildcat in Section 32-11n-22w in the San Emigdio district of Kern County in the extreme southern end of San Joaquin basin and in an area where a number of unsuccessful wildcats have been drilled in the past. It is a combination seismograph and geologic shot

total of 7,258 feet of 2½-inch tubing was used with the bottom 31 feet perforated. The well is located in the west central part of Section 7-20-16 and has an elevation of 781 feet.

Standard Oil Co. No. 71-13-C in Section 13-20-15 failed to find the pay at the predetermined depth but the bit went into the Gatchell zone of Eocene age at 6,765 feet and was still in the oil sand at the close of the week. Indications point to completion of an excellent well. The Texas Co. which has been held up with a fishing job for the past few years recovered the fish a few days ago and has resumed work. This well is an offset of Superior Oil Co. No. 1 Cagle in Section 6-20-16 which to date has shown the largest thickness of oil sand in the Gatchell zone. No. 4 fee of Superior Oil Co. located a few hundred feet southeast of the Texas Co. No. 1 Exeter is drilling ahead at 7,705 feet but has not yet logged the pay. Holly Oil Co. is making preparations to begin drilling operations soon on its first well on the Abrams property in Section 12-20-15 north of the discovery well and west of Superior Oil Co.'s completed well on the Cagle lease.

Dominguez

Union Oil Co. added two wells to its list of producers in the Dominguez field of Los Angeles County this week by completing No. 66 Callender and recompleting No. 25 on the same lease. The former, a new well, was finished flowing 890 bbls. of clean 33.9-gravity oil and 1,080,000 cu. ft. of natural gas per day through a 40/64-inch bean from 6,870 feet. This new well was finished with a 7-inch water string landed at 6,365 feet and 533 feet of 5½-inch liner including 500 feet of perforated landed at 6,869 feet. No. 25 Callender, a former upper zone producer, was returned to production pumping 360 bbls. of very clean 32.5-gravity oil per day from 4,795 feet after the hole had been finished with an 8⅝-inch water string landed and cemented at 4,390 feet and 214 feet of 5½-inch liner including 196 feet of perforated landed at 4,794 feet. Shell Oil Co. is rigging up rotary to deepen No. 27-A Reyes which is down 4,075 feet. Shell suspended drilling on No. 97 Reyes a week or so ago at 10,000 feet when no deeper producing zone was found above that point. Union Oil Co. is running two strings of tools in the Dominguez field and is preparing to spud No. 67 Callender which will be carried down into the lower zone.

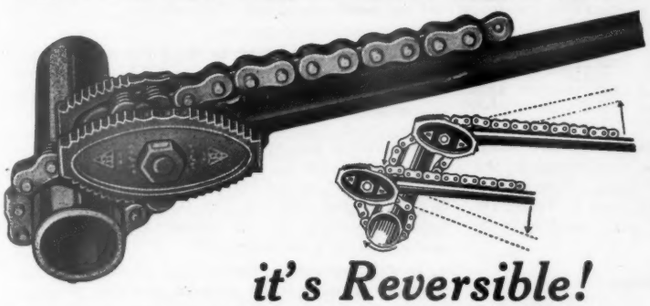
Montebello

Drilling operations are still on the increase in the Montebello extension and several additional wells will be started within 10 days. McVicar & Rood recompleted No. 1 Manz after drilling down into the seventh zone and returned it to production flowing 570 bbls. of clean 40.5-gravity oil and 2,500,000 cu. ft. of gas per day from 7,240 feet. It was deepened from the fifth zone at 5,780 feet and brought in flowing through a 26/64-inch bean. Recent completions in the seventh zone indicate that the effort made to retard exploration of the zone until next year has failed and that more wells will be carried down into this horizon as time goes on. This is particularly true of drilling operations in the town lot area and west of present work. St. Helens Petroleum Co. is making preparations to complete No. 30 Monterey in the seventh zone with bottom of the hole at 7,275 feet. This well with a 5⅝-inch liner cemented at 7,275 feet recently showed favorably on a formation test. The top 80 feet of this liner is drillable liner and present plans call for the shooting of 10 holes at 6,760-65 feet which will be opposite the lower member of the sixth zone. St. Helens has two additional strings of tools in operation in this field and will probably maintain this level for several months as most of the necessary offset work has been finished. Standard Oil Co. has five strings of tools in operation and has a new derrick erected for No. 6 Whitehead.

Union Oil Co. has reached a depth of 8,290 feet in No. 30 La Merced in the extreme eastern end of the western extension of the Montebello field but has not found anything out of the ordinary since passing the 7,500-foot level where a thin but promising oil sand was cored. This zone is believed to be well below the base of the seventh zone. The company has decided to drill ahead in order to determine whether any additional productive zones might exist in the area. No. 30 La Merced is south of production in the older section of the field and a successful com-

BILLINGS

THE BILLINGS & SPENCER CO. HARTFORD, CONNECTICUT, U. S. A.



it's Reversible!

"RED HEAD" Chain Pipe Wrench

"Billings always have been good" is what Oil Field Workers say about the "RED HEAD"! You can turn pipe in either direction without removing the "RED HEAD", saving time and labor. The double jaw takes a firm "bite" and when worn can be reversed, doubling the wrench life. Standard single nut and bolt assembly can be replaced from local stores. A safe, long life Wrench—that's Billings "RED HEAD".

For a Fittings Wrench—remove the outer jaws of the "RED HEAD"—it makes a strong Fittings Wrench for narrow beads on fittings and flanges. Billings also make the "RED HEAD" Single Jaw, Back-Up and Break-Out, "Gardnerench" and the Billings Improved Chain Pipe Vise—all well known among Oil Field Workers for their strength, safety and rapidity in use.

Billings Chains

Separate Chains (complete) are packed in sturdy boxes plainly marked designating the wrenches with which they are used.

41st Edition CATALOG Have you a copy?

ASK YOUR DISTRIBUTORS SALESMAN

FORGED TOOLS

COMMERCIAL DROP FORGINGS · BOARD DROP HAMMERS and DIE MAKING MACHINERY

Renew Your Subscription Promptly

DAY and NIGHT "WATCHMAN"

FOR OIL FIELD PUMP OWNERS

SHEAR-RELIEF Valve users have the satisfaction of knowing that their pumps and pump parts are safe, 24 hours in the day, against the hazards of excess pressure . . . that their operators can set the valve and forget it . . . that, at a predetermined pressure, the nail will shear and prevent costly blow-ups. From experience they know that any member of the crew can set this valve, following full directions on the name-plate. And, from experience, pump owners know that common wire nails are mighty low maintenance cost.

See our section, your 1939 Composite Catalog for complete details.

FLUID-ACTION CLUTCH PUMPS
ABERCROMBIE PUMP CO.
GULF BLDG. HOUSTON TEX.

SHEAR-RELIEF VALVE

RYERSON
Certified
STEELS

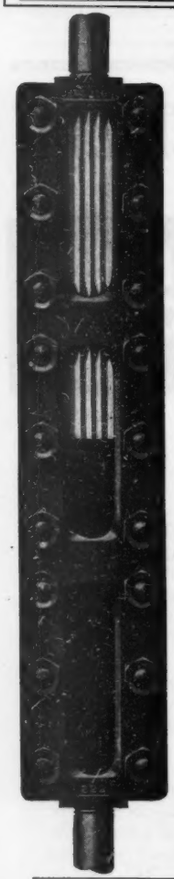
IMMEDIATE STOCK SHIPMENT

Ryerson Certified Steels represent the highest quality obtainable in each class and type of material. Stocks include: alloy and tool steels, Allegheny stainless, structurals, bars, shapes, plates, sheets, shafting, tubing, reinforcing bars, bolts, nuts, welding rod, building products, metal working tools, etc.

Write for the Ryerson Stock List.

JOSEPH T. RYERSON & SON, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Cleveland, Detroit, Buffalo, Boston, Philadelphia, Jersey City. Offices at: Tulsa, Kansas City, Minneapolis.

JERGUSON



REFLEX GAGES

Ruggedly Built for Long Service

Ideal for gasoline, kerosene, steam, oil, and other liquids. No matter what the color of liquid the . . .

Empty space shows

WHITE

Liquid level appears

BLACK

Sensitive and accurate; not affected by external shocks or vibration. No adjustments needed. Safe at high pressures and temperatures. Easily read.

Use JERGUSON TRANSPARENT (thru vision) GAGES when you need to show the color and density of liquids.

There's a JERGUSON GAGE for your plant

Jerguson Gages are best By every real test

Catalog on Request

JERGUSON GAGE & VALVE CO.
85 FELLSWAY
SOMERVILLE, MASS.

ST. LOUIS HOSPITALITY

Is at its best in this comfortable, conveniently located hotel, where service and good food are a byword.

HOTEL Lennox
9TH AND WASHINGTON
Over 50% of all rooms $3.50 or less single $5.00 or less double

TANKER SHIPMENTS FROM LOS ANGELES TO DOMESTIC AND FOREIGN PORTS

	March 18 Total this week	March 18 Daily average	March 11 Total last week	March 11 Daily average	This year to date	Same time last year
Intercoastal-domestic—						
Crude oil	62,831	8,976	.....	.....	123,473	70,180
Fuel oil	.....	.....	.....	.....	324,591	.....
Diesel and gas oil	.....	.....	.....	.....	163,501	.....
Gasoline	.....	.....	106,840	15,263	302,594	461,496
Kerosene	.....	.....	.....	.....	56,940	132,575
Foreign exports—						
Crude oil	304,424	43,489	230,123	32,875	3,253,213	4,866,818
Fuel oil	110,425	15,775	61,892	8,842	1,474,112	1,748,717
Diesel and gas oil	122,988	17,570	79,763	11,395	894,991	984,822
Gasoline	91,143	13,020	109,596	15,657	1,791,294	1,114,320
Kerosene	.....	.....	17,046	2,435	234,151	211,063
Coastwise-domestic—						
Crude oil	279,680	39,954	436,130	62,304	2,162,842	2,192,970
Fuel oil	146,607	20,944	180,505	25,786	1,887,012	2,749,479
Diesel and gas oil	57,951	8,279	29,605	4,229	622,116	353,624
Gasoline	341,316	48,759	102,961	14,709	2,596,732	3,061,393
Kerosene	13,117	1,874	18,114	2,588	90,065	61,520

TANKER SHIPMENTS FROM SAN FRANCISCO TO DOMESTIC AND FOREIGN PORTS

Intercoastal-domestic—						
Diesel and gas oil	.....	.....	.....	.....	69,550	178,662
Asphalt	.....	.....	.....	.....	.....	73,449
Lubricants	.....	.....	.....	.....	4,170	.....
Foreign exports—						
Crude oil	133,200	19,029	.....	.....	1,051,458	760,177
Fuel oil	62,663	8,952	.....	.....	407,380	256,214
Diesel and gas oil	9,821	1,403	.....	.....	316,127	181,973
Gasoline	159,793	22,828	.....	.....	770,023	975,680
Kerosene	113,375	16,196	.....	.....	262,209	110,450
Lubricants	3,917	560	.....	.....	88,188	82,632
Coastwise-domestic—						
Fuel oil	173,618	24,803	170,213	24,316	1,204,210	1,432,246
Diesel and gas oil	35,420	5,060	45,902	6,557	122,874	382,622
Gasoline	241,397	34,485	212,937	30,420	935,570	1,447,530
Kerosene	18,647	2,664	32,311	4,616	128,401	172,031

TOTAL TANKER SHIPMENTS FROM CALIFORNIA TO DOMESTIC AND FOREIGN PORTS

Intercoastal-domestic—						
Crude oil	62,831	8,976	.....	.....	123,473	70,180
Fuel oil	.....	.....	.....	.....	324,591	.....
Diesel and gas oil	.....	.....	.....	.....	233,051	178,662
Gasoline	.....	.....	106,840	15,263	302,594	461,496
Kerosene	.....	.....	.....	.....	56,940	132,575
Asphalt	.....	.....	.....	.....	.....	73,449
Lubricants	.....	.....	.....	.....	4,170	.....
Foreign exports—						
Crude oil	437,624	62,518	230,123	32,875	4,304,671	5,626,995
Fuel oil	173,088	24,727	61,892	8,842	1,881,492	2,004,931
Diesel and gas oil	132,809	18,973	79,763	11,395	1,211,118	1,166,795
Gasoline	250,936	35,848	109,596	15,657	2,561,317	2,090,000
Kerosene	113,375	16,196	17,046	2,435	496,360	321,513
Lubricants	3,917	560	.....	.....	88,188	82,632
Coastwise-domestic—						
Crude oil	279,680	39,954	436,130	62,304	2,162,842	2,192,970
Fuel oil	320,225	45,746	350,718	50,103	3,091,222	4,181,725
Diesel and gas oil	93,371	13,339	75,507	10,787	744,990	736,246
Gasoline	582,713	83,245	315,898	45,128	3,532,302	4,508,923
Kerosene	31,764	4,538	50,425	7,204	218,466	233,551

pletion would greatly extend the productive limits of the field. This is the deepest well drilled in the west end of the Montebello structure. Several new wells are being started east and south of Union Oil Co. No. 1 Calkins, one of the really good wells in the field.

Newhall—Potrero

Barnsdall Oil Co. completed another excellent producing well on the Rancho San Francisco in the Newhall district of Los Angeles Basin when No. 5 was brought in flowing 1,180 bbls. of clean 34.9-gravity oil and 650,000 cu. ft. of natural gas per day from 7,103 feet. Flow was through a 24/64-inch bean and tubing pressure was 950 pounds and casing pressure was 1,250 pounds, indicating that the well is capable of greatly exceeding its present restricted rate. Production was reduced to below 500 bbls. per day and will soon be lowered to the present allowable of 300 bbls. daily. No. 5 Rancho San Francisco has several hundred feet of oil sand and is the fifth well completed in this field by Barnsdall Oil Co. which up to the present is the only operator to develop production in the district. The well was finished with an 8⅝-inch water string landed at 6,360 feet and 755 feet of 5¾-inch liner including perforations at 6,372-6,533 feet, 6,553-6,824 feet, 6,846-6,925 feet and at 6,936-7,101 feet. Top of the pay was logged at 6,379 feet and the well has an elevation of 1,180 feet. Derrick for No. 6 Rancho San Francisco in Section 27-4-17 is nearing completion and present plans call for continuous drilling. Barnsdall Oil Co. discovered this field May 2, 1937, and has completed five producing wells. The formation is very hard for a large portion of the way and drilling operations require a longer time than in most other fields in southern California.

Los Angeles Basin

The Aliso Canyon field of Los Angeles Basin and close to the county line separating Los Angeles and Ventura counties is rapidly taking on the appearance of an active oil field and will soon become more pronounced. Tide Water Associated Oil Co., discoverer of the Aliso Canyon field, has one producing well, one drilling well and locations staked or rigs in course of construction for four additional wells. These new wells are Nos. 3, 4 and 12 on the Porter lease in Section 27-3-16 and No. 1 Fernando in the same section. Standard Oil Co. is making good progress on its drilling project on the Ward lease and Union Oil Co. is right behind with No. 1-27 Orcutt. Standard and Union are drilling first line offsets to Tide Water Associated Oil Co.'s discovery well.

In the Huntington Beach field, Wilshire Oil Co. recompleted No. 2 H. B. pumping 363 bbls. of clean 23.7-gravity oil per day from the tideland accumulation with bottom of the hole at 5,450 feet. This well was originally completed several weeks ago but did not hold up until the hole was cleaned out.

A "REFINED" PRODUCT

"The Entirely Different Boiler and Engine Treatment"

Sand-Banum is the pure colloidal concentrate that is free from all extraneous material. It comes in 16-oz. cans—*ready to use!*

Because of its high concentration of active ingredients one can protects a 250 Hp. boiler against scale and corrosion for a month! It enables boilers and engines to operate efficiently and economically regardless of the operating conditions or the nature of the water used. It is always safe and never carries over with the steam!

You don't have to buy it—PROVE IT FIRST! Try Sand-Banum for 30, 60 or 90 days. If it doesn't do everything we say it will, *you owe us nothing!*

VISIT BOOTH 232
OIL-WORLD EXPOSITION, APRIL 24-29.

AMERICAN SAND-BANUM CO., Inc.
9 Rockefeller Plaza New York City

Michigan Field Report

By
O. C. PRESSPRICH

Week's Record 14 Oil Wells, 5 Dry Holes, 23 New Starts

SAGINAW, Mich., Mar. 27.—The scramble for southwestern Michigan oil picked up speed during the past week, completions and new permits in that area virtually monopolizing the picture.

Of the 23 licenses to drill issued by the State Conservation Department last week, all but one were for wells in the southwestern area, and all but three of the 14 successful completions of the week were in three counties in that section of the state.

Activity in the present center of the oil industry in Michigan—Bloomingdale Township of Van Buren County—resulted in seven successful completions; Allegan County recorded four finished producers and Kent County, still much in the exploratory stage, had one, a minor producer.

Muskegon Oil Co., completing No. 2 Sutter, NE NW NW Section 11, in Salem Township, Allegan County, had the best results of the week. Completed at 1,590 feet, the well produced naturally at the rate of 1,500 bbls. a day. In the Central Michigan area, C. W. Teater completed another good well, No. 8 Van Horn, SE SW NE Section 3, Freeman Township, Clare County, being rated at 2,000 bbls. daily after acid. The well was completed at a total depth of 3,897 feet. The two other completions in the orderly development of the Clare area were Pure Oil Co. wells, drilled in Redding Township, one producing 300 bbls. daily after being acidized. The other, however, was a dry hole.

Three completions in Section 8 featured the activity in Bloomingdale, where the week's seven producing wells had production ranging from 200 to 1,000 bbls. daily. The one Kent County well produced only 48 bbls. daily.

An attempt for gas in Sumner Township of Gratiot County was abandoned. Drilling on the No. 1 Wood-Nickert, Section 33, was halted at a depth of 989 feet. A test for oil in Spring Lake Township, Ottawa County, also was a failure, as was W. J. Sovereign's test in Adams Township, Section 25, Arenac County, abandoned as dry at a total depth of 2,986 feet. Sun Oil Co. failed, too, in Gladwin County, abandoning its No. 1 Tuckerman in Section 2 of Beaverton Township, after the hole was drilled to the unusual depth of 3,999 feet.

Of the 12 new permits for Van Buren County, 8 were for Bloomingdale Township, 4 for Columbia. Six others went to Allegan County, in Salem, Hopkins, and Trowbridge townships. Three went to Kent County, and a wildcat venture was listed for Thornapple Township, Barry County. The one Central Michigan permit was for a Sun Oil Co. test in Hope Township of Midland County.

Despite the element of uncertainty in connection with the Kent County development, interest there continues high and the city of Grand Rapids, alarmed by possibilities that the Bloomingdale townlot experience may be repeated in that locality, is taking steps to regulate the development, should it occur in that city. A city ordinance, requiring a $25 license for townlot drilling, is under consideration, because tests now under way in the county are nearing the city limits.

Following summarizes the past week's completions, which added better than 8,000 bbls. daily to the state's potential production:

Allegan County

Hopkins Township (3n-12w)—After being acidized, the Bell-Marks No. 1 Klomparens, SW NW NW Section 23, produced at a rate of 200 bbls. a day. The well was completed at a total depth of 1,639 feet.

Salem Township (4n-13w)—Two good producers and a third rated fair to good were completed in the growing Salem field. The Socony-Vacuum Oil Co. No. 1 Twining, SE SE SE Section 3, produced at an estimated daily rate of 1,000 bbls. after having been acidized at the completion depth of 1,606 feet. Production at the Gordon Oil Co.-Wilson No. 2 Sutter, SE NW NW Section 11, was reported as 250 bbls. daily natural flow. That well's total depth is 1,614 feet. Fifteen hundred barrels natural flow was registered by the Muskegon Oil Co. No. 2 Sutter, NE NW NW Section 11, which was completed at a depth of 1,590 feet.

Arenac County

Adams Township (19n-3e)—The W. J. Sovereign No. 1 Milne, SE NE NW Section 25, was abandoned as a dry hole after being drilled 2,986 feet.

Clare County

Freeman Township (18n-6w)—Best producer of the week in the Central Michigan fields, C. W. Teater No. 8 Van Horn, SE SW NE Section 3, was completed at a total depth of 3,897 feet. After it was treated with acid the well produced at a rate of 2,000 bbls. a day.

Redding Township (19n-6w)—Pure Oil Co. got a producer and a failure in the Redding pool. Its No. 2-A B. Switzer, N half NW SW Section 27, completed at a depth of 3,913 feet, was treated with acid to bring production to 300 bbls. a day, but the No. 2 Bert Douglas, SE NW SW Section 34, drilled a total of 3,937 feet was a dry hole.

Gladwin County

Beaverton Township (17n-2w)—The test made by Sun Oil Co. with the No. 1 Tuckerman, E half NE NE Section 2, was a failure. The dry hole was abandoned after being drilled 3,999 feet.

Kent County

Walker Township (7n-12w)—Completion of a small producer in the Kent County area now being rather extensively tested, mostly added uncertainty to the prospects for the new section. The Archie M. Henry No. 1 M. Slykhouse, NW SW SE Section 32, completed at 1,850 feet, produced 48 bbls. daily after being treated with acid.

Gratiot County

Sumner Township (11n-4w)—The No. 1 Wood-Nickert and others, C E half Section 33, a gas test for R. M. Burch, as trustee, was a failure. The attempt was abandoned after drilling 989 feet.

Ottawa County

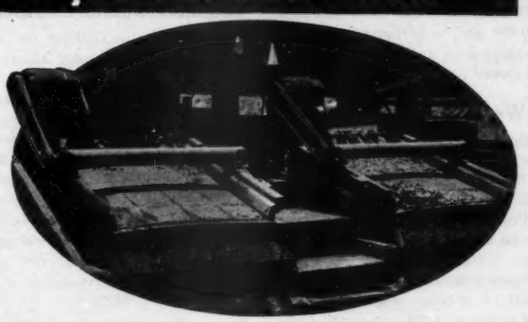
Spring Lake Township (8n-16w)—The Rycenga & Burt No. 1 Knoll, NW NE NE Section 29, was a dry hole, being abandoned at a total depth of 2,146 feet.

Van Buren County

Bloomingdale Township (1s-14w)—All seven completions this past week in the continually growing Bloomingdale field were successful wells, production per well running as high as 1,000 bbls. a day. Acidized to a 500-bbl. daily output, O. O. Borden No. 3 Stewart, SE NW SE Section 7, was completed after drilling to 1,212 feet. Three wells were completed in Section 8, they being Fisher & McCall No. 2 Melvin, NW SE SW, Fisher & McCall No. 3 Melvin, NE SE NW, and the Jenkins & Haskins No. 1 Rogers, SW SW NW. The No. 2 Melvin produced 200 bbls. a day after it was acidized, while similar treatment increased No. 3 Melvin yield to 1,000 bbls., and the No. 1 Rogers to 250 bbls. daily. Completion depths were No. 2 Melvin, 1,227 feet; No. 3 Melvin, 1,208 feet; No. 1 Rogers, 1,230 feet. Bloomingdale Development Co. completed No. 2 Merrifield, SW SW NW Section 16, at 1,202 feet. The well produced 200 bbls. daily after it was acid treated. Wiser Oil Co. had two good wells in Section 17. No. 8 Boyer, NW NE NW, flowed naturally at a 300-bbl. rate. It was completed at 1,213 feet. No. 10 Boyer, NW NE NE, rated 400 bbls. naturally at 1,231 feet.

LINK-BELT MUD SCREENS
Quickly Save their Cost

● This Link-Belt dual vibrating screen hook-up is taking shale and other abrasive materials out of drilling mud. Besides keeping destructive materials out of contact with pump parts, thus vastly reducing pump maintenance, a valuable saving in the cost of mud alone is made. For the most efficient, dependable, economical method of reconditioning rotary mud—specify Link-Belt screens.



LINK-BELT COMPANY, Philadelphia, Houston, Dallas, Los Angeles, Indianapolis, Chicago, New York. Sold by Most Supply Houses.

7541-A

LINK-BELT Vibrating SCREEN

Canadian Fields

Completions and Operations in Northwest and in Ontario

By VICTOR LAURISTON

CHATHAM, Ontario, Mar. 25.—The latest summary of Turner Valley crude production, based on figures of the Alberta Conservation Board, shows a total of 67 producing wells with aggregate potential flow of 57,059 bbls. a day through 1-inch choke. This list does not include four wells, finished in the lime, which have not completed official tests. The present daily allowable is 10,587 bbls., and it is believed a production around 25,000 to 30,000 bbls. could be maintained if markets were available. The field in 1938 for a time produced a peak of 25,000 bbls. a day with fewer wells completed. It is expected that as the season advances and accumulated stocks are reduced, the allowable will be increased.

Tests in the Lime

In North Turner Valley, Royalite Oil Co. No. 35, LSD 7, Section 27-20-3w5, is below 6,745 feet after getting the Madison limestone at 6,173 feet. This is below the normal depth in the lime, around 450 feet, at which South Turner Valley wells usually get crude production. Royalite No. 35 is a southwesterly offset to Royalite No. 29, LSD 9, same section, which finished in the black lime at 6,920 feet, some 650 feet in the Madison. At this depth the lime was tight, but acidizing converted a naturally small well into a large producer, with a present allowable of 161 bbls. a day.

In the southwest extension of South Turner Valley, D. & D. Oils No. 1, LSD 12, Section 9-18-2w5, finished at 7,400 feet, was unable to set packer to separate the two porous horizons, owing to acid treatments having cut too deeply into the lime. Plans to reacidize have been abandoned, and the well will be put on production. A bottom-hole pump will likely be installed to help lift the crude. Production is estimated at 500 bbls. a day.

West of the main field, Okalta Oil Co. No. 6, LSD 3, Section 30-18-2w5, cemented back to 9,994 feet, is preparing to install bottom-hole pump to take production from the upper porous horizon.

West Central Field

In Section 18-19-2w5, West Central Turner Valley, Davolite Oil Co. No. 1, LSD 10, is in the Belly River formation below 1,129 feet. In Section 7-19-2w5, Valley Drilling Co. No. 1, LSD 11, is standing at 350 feet. In Section 6-19-2w5, East Crest Oil Co. No. 4, LSD 8, is below 6,846 feet.

In Section 5-19-2w5, Calwin Royalites No. 1, LSD 15, is below 4,832 feet. Royalite Oil Co. No. 40, LSD 4, is in the Belly River formation after running 13⅜-inch casing to 1,052 feet. Winalta Royalties No. 1, LSD 1, is below 3,213 feet, after getting the cardium sandstone at 2,930 feet.

West Side Drilling

In Section 32-18-2w5, George Harris and associates No. 2, LSD 15, is in the lower Benton formation below 4,335 feet after getting the cardium sandstone at 4,040 feet. Oil Ventures No. 1, LSD 14, is below 4,651 feet. Vantage Oils No. 1, LSD 12, is in the Belly River formation below 1,045 feet. British Colonial Oils No. 1, LSD 5, is below 5,720 feet.

West Turner Petroleums No. 4, LSD 3, Section 32-18-2w5, is completing rigging after delay due to bad weather. The test is being drilled by Pacific Petroleums, Ltd., which has taken over the West Turner holdings of 150 acres and three producing wells and also holdings of British Pacific Oils, Ltd., totaling 1,160 acres on the Turner Valley west flank.

In Section 29-18-2w5, Royal Canadian Oil Co. No. 3, LSD 12, is below 1,622 feet. Royalite Oil Co. No. 39, LSD 3, is deepening after cementing casing at 3,042 feet.

In Section 20-18-2w5, York Oils No. 1, LSD 6, is below 6,254 feet.

In Section 17-18-2w5, Extension Royalties No. 2, LSD 11, is in the Benton formation below 2,368 feet. Anglo-Canadian Oil Co. No. 4, LSD 6, is below 4,423 feet. Anglo-Canadian No. 6, LSD 3, is in the Belly River formation below 2,238 feet. Royalite Oil Co. No. 41, LSD 1, is waiting for drilling outfit.

In Section 16-18-2w5, Okalta Oil Co. No. 8, LSD 6, is in the lower Benton formation below 4,250 feet.

In Section 9-18-2w5, George Harris and associates No. 1, LSD 13, is in the Blairmore formation below 6,353 feet and getting close to the Home sand.

In Section 5-18-2w5, Theo Grewer No. 1, LSD 14, bottoming at 350 feet, is working on casing.

West of the main field, Anglo-Canadian Oil Co. No. 5, LSD 8, Section 31-18-2w5, is below 5,829 feet. Scottish Petroleums No. 1, LSD 16, Section 19-18-2w5, is below 6,265 feet. Royalite Oil Co. No. 38, LSD 16, Section 8-18-2w5, is in the Kootenay formation below 6,781 feet and getting close to the Madison limestone.

Commonwealth Incorporation

Commonwealth Drilling Co., Ltd., has been incorporated under Alberta charter with head office at Calgary as a wholly owned subsidiary of Commonwealth Petroleums, Ltd. The new company will drill Command Oils No. 2, located some time ago in LSD 11, Section 29-18-2w5, starting work early in the spring; and will also carry on drilling for the Commonwealth and Commoil companies. Officers of Commonwealth Drilling Co. are: President, F. F. Reeve; vice president, A. B. MacKay; secretary, G. J. McKay; manager, G. T. Wright.

Twin Dome Operations

On the Twin Dome structure northeast of Turner Valley, Anglo-Canadian Oil Co. No. 1, LSD 7, Section 16-21-28w4, has resumed drilling after cementing casing at 6,681 feet, some 30 feet in the Madison limestone. A good showing of oil was found in the Dalhousie sand above the lime, and smaller shows of oil and gas at the lime contact, with no indications of water. The test is expected to reach the producing horizon about April 10. Location is east and somewhat north of previous tests drilled east of Turner Valley, in which the lime was indicated at much greater depth; and in the Twin Dome well the Madison was higher than in many of the recent west flank Turner Valley crude producers. Anglo-Canadian Oil Co. has taken over 35,000 acres of leases on the structure in addition to its previous holdings of 10,000 acres.

Northern Foothills

On the Brazeau structure in the northern foothills west of Edmonton, Home Oil Co. No. 1, LSD 16, Section 7-43-17w5, is in the basal Benton formation below 4,880 feet and is believed close to the Blairmore. The Benton appears somewhat deeper than Turner Valley, but the underlying formations above the lime are expected to thin out considerably.

On the Clearwater structure, Altoba No. 1, Section 31-34-9w5, is in the Devonian limestone below 1,807 feet.

On the Ram River structure, Ram River Oils No. 1, Township 38-12w5, is below 920 feet in a soft lime formation with small shows of crude. Some crevices in the limestone had to be cemented.

On the Grease Creek structure west of Olds, Grease Creek-Northwest Co. No. 1, LSD 2, Section 13-29-7w5, is in the lower Benton formation below 2,120 feet. The first potential oil horizon is the McDougall-Segur sand which is expected in a few hundred feet.

Practically the entire area from Grease Creek to North Turner Valley has been leased wherever structure is indicated; and it is expected a number of new tests will be started this spring.

Waite Valley Test

Northwest of Home Oil Co. No. 2 Millarville producer in North Turner Valley, National Petroleum Corp. of Calgary is preparing to drill a wildcat on the Waite Valley structure. Location has not been definitely selected but will be close to Richfield Petroleums No. 1, LSD 4, Section 25-20-4w5, abandoned in 1930 at 4,785 feet. The National Petroleum test will spud about May 1, starting with cable tools and finishing with rotary. The company's holdings of 12,000 acres include about 9,000 acres subleased on 5 to 7½ per cent royalty from Waite Valley Holding Co.

Southern Foothills

On the Highwood-Sinclair structure southwest of Turner Valley, Green Valley Oils No. 1 Banner, LSD 6, Section 34-17-3w5, is in hard lime below 6,830 feet with a slight increase in gas flow.

On the Savannah Creek structure, Anglo-Canadian Oil Co. No. 1, SW Section 20-14-4w5, is below 401 feet.

On the Watson structure, Mar Jon Oil Co. No. 1, LSD 3, Section 4-10-2w5, has installed rotary equipment and will resume from 6,120 feet as soon as weather is favorable. The test is standing in the Blairmore formation, and should get the lime within a few hundred feet.

Castle River Test

In the Pincher Creek area, near the Montana boundary, Anglo-Canadian Oil Co. No. 1 Castle River, LSD 4, Section 11-6-1w5, is shut down at 7,189 feet after encountering some indications of faulting, after drilling in the Blairmore formation. The test had previously been expected to finish in the Madison limestone around 8,000 feet.

Border Fields

In the Barnwell area, southern Alberta, Border Petroleums No. 1, LSD 5, Section 32-19-17w4, is below 3,068 feet, after considerable delay due to cementing against cavings. The test is believed high on structure, with the Clancey sand, a potential oil horizon, expected around 3,200 feet. Several small oil shows have been met, but no water.

On the Del Bonita structure, Terminal Oil Co. is preparing to place No. 1 well, NE quarter Section 18-1-21w4, on production, after gun-perforating the casing in two oil sands and a gas sand. Terminal No. 2, NW quarter Section 7-1-21w4, will be deepened from 175 feet.

In the Lethbridge area, Lethbridge Petroleums & Refining No. 1, LSD 12, Section 11-8-22w4, will resume this spring from 2,915 feet. Reports that Imperial Oil, Ltd., would drill a second well south of Lethbridge are denied by T. A. Link, chief geologist for the company. Imperial-Lethbridge South No. 1, LSD 8, Section 1-8-21w4, was abandoned last year in the limestone at 4,095 feet after encountering oil shows just above the lime and water at the contact.

Steveville Operations

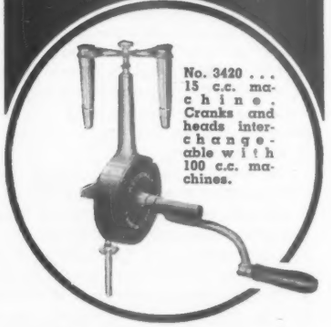
In the Steveville area, east of Calgary, Anglo-Canadian Oil Co. is assembling two 320-hp. Diesel engines at location for drilling No. 2 well, spotted some time ago in LSD 4, Section 14-20-11w4. Test will spud early in April. This is the first installation of light rotary Diesel equipment in Canada. It is being set up under supervision of Ralph Will by Drilling Contractors, Ltd., who will drill the well; and is expected to reach the producing horizon in about three weeks. Anglo Canadian No. 1, LSD 2, Section 13-21-12w4, is standing with 7-inch casing cemented in the top of the limestone at 3,178 feet, and may later be finished with light-duty equipment.

Ribstone-Blackfoot Project

Highwood-Sarcee Oils, Ltd., of Calgary has secured a practically solid block of 27,000 acres in the Blackfoot Hills area, about 10 miles southwest of Lloydmin-

(Continued on Page 227)

For QUICK, ACCURATE TESTS
Use CURTIN CENTRIFUGES



No. 3420 . . . 15 c.c. machine. Cranks and heads interchangeable with 100 c.c. machines.

Simple in design . . . Ruggedly built . . . Require no special care . . . Gear Ratio and throw of crank produce required speed with no strain. Curtin Centrifuges meet all *A.S.T.M. Standard Method D-96-35* and *A.P.I. Code No. 25* requirements. Fully descriptive literature upon request.

W·H·CURTIN & CO. Inc.
HOUSTON U.S.A. TEXAS

WILDCAT OPERATIONS

CALIFORNIA

IMPORTANT WELLS AND NORTHERN CALIFORNIA WILDCATS

Company, well, location, and county—	S. T. R.	Depth	Status—
Moore, E. H., No. 11 Sugar, Santa Maria Valley, S. B.	19-10-34	4,607	sd. sh. drlg.
Moore, E. H., No. 12 Sugar, Santa Maria Valley, S. B.	19-10-34	4,860	sd. sh. drlg.
Getty, G. F., No. 8 Vicente, Santa Maria Valley, S. B.	27-10-34	4,982	flow 500 b.d.
Gerard & Thompson, No. 1-B, Santa Maria Valley, S.B.	27-10-34	5,020	sd. sh. drlg.
Richfield Oil Corp., No. 1 Tinaquaic, Foxen Can., S. B.	36- 9-32	4,840	sd. sh. drlg.
Barnsdall Oil, No. 5 Magenheimer, Gato Ridge, S. B.	9- 8-32	4,385	rig to pump
General Pet., No. 1 Chamberlin, Los Olivos, S. Barb.	12- 7-31	3,161	sd. sh. drlg.
United West. Oil, No. 1 Los Olivos, Santa Barbara	16- 7-30	3,552	hd. sd. drlg.
Litho Oil, No. 1 R. I. E., Capitan, Santa Barbara	5 -4-30	1,370	sd. sh. drlg.
West Oil Roy., No. 1 Bryce, Carpinteria, Santa Barb.	29- 4-25	2,062	sd. sh. drlg.
Garvin & Seaman, No. 1 Gauthier, Summerland, S.B.	22- 4-26	1,496	idle
Oil Group, Inc., No. 1 Hyland, Summerland, S. B.	16- 4-26	412	sd. sh. drlg.
Merchants Pet., No. 8 Hillside, Sespe, Ventura	1- 4-20	1,770	sd. sh. drlg.
Ivers, H. A., No. 14 Kentuck, Sespe, Ventura	1- 4-20	1,181	sd. sh. drlg.
Section 20 Oil, No. 21, Sespe, Ventura	20- 5-19	2,547	recmtd. 2,537
Shomy Oil, No. 1 Hill, Bardsdale, Ventura	32- 4-19	202	sd. sh. drlg.
Continental Oil, No. 10 Grubb, San Miguelito, Vent.	24- 3-24	7,035	flow 2,684 b.d.
C. C. M. Oil, No. 7-A Hobson, Padre Canyon, Ventura	15- 3-24	1,980	sd. sh. drlg.
C. C. M. Oil, No. 25-B Hobson, Rincon, Ventura	17- 3-24	4,261	gr. sd. drlg.
Rincon Dev., No. 82-4 State Permit, Rincon, Ventura	7- 3-24	4,150	redrlg. 1,880
Tide Water A. O., No. 40 V.L.W., Ventura Ave., Vent.	25- 3-23	9,004	sd. sh. drlg.
Tide Water A. O., No. 14 McGonigle, Vent. Ave., Vent.	23- 3-23	6,150	sd. sh. drlg.
Tide Water A. O., No. 77 Lloyd, Ventura Ave., Vent.	27- 3-23	8,294	sd. sh. drlg.
Tide Water A. O., No. 123 Lloyd, Ventura Ave., Vent.	27- 3-23	6,984	sd. sh. drlg.
Tide Water A. O., No. 124 Lloyd, Ventura Ave., Vent.	23- 3-23	4,685	sd. sh. drlg.
Tide Water A. O., No. 134 Lloyd, Ventura Ave., Vent.	27- 3-23	8,339	recmtd. 8,050
Tide Water A. O., No. 8 Hartman, Ventura Ave., Vent.	22- 3-23	6,391	sd. sh. drlg.
Shell Oil, No. 98 Taylor, Ventura Ave., Ventura	21- 3-23	5,564	cmtd. 5,175
Shell Oil, No. 33 Edison, Ventura Ave., Ventura	28- 3-23	5,135	cmtd. 5,130
Brit. Amer. Oil, No. 7 Bolsa, Ventura Ave., Ventura	22- 3-23	7,970	sd. sh. drlg.
Alliance Pet., No. 3 Hisey, Ventura Ave., Ventura	21- 3-23	6,660	sd. sh. drlg.
Lloyd Corp., No. 2 Dabney, Vent. Ave., Ventura	23- 3-23	8,894	sd. sh. drlg.
Cal. Expl. Co., No. 2 Occidental, Lost Hills, Kern	24-26-20	5,625	salt water
Belridge Oil, No. 26-39, North Belridge, Kern	26-27-20	6,760	br. sh. drlg.
Belridge Oil, No. 28-16, North Belridge, Kern	28-27-20	2,994	sd. sh. drlg.
Tide Water A. O., No. 23-3, North Belridge, Kern	22-27-20	7,330	hd. sd. drlg.
Richfield Oil, No. 3 Belridge, North Belridge, Kern	22-27-20	7,596	br. sh. drlg.
Honolulu Consd., No. 63 Michelson, Belridge, Kern	14-28-20	1,194	sd. sh. drlg.
Amerada Pet., No. 6 Beer, Blackwell's Corner, Kern	21-26-19	4,591	dry; dbd.
Standard Oil, No. 1 M. & L., Delano gas field, Kern	3-25-23	2,462	flow 7,500 mcf
Dilamar Oil, No. 3 Quinn, Jasmin, Kern	15-25-27	2,230	sd. sh. drlg.
Crestmont Oil, No. 1 Coffee, Round Mountain, Kern	8-28-29	1,502	P.B. 1,330
Trico O. & G., No. 1 Olcese, Round Mountain, Kern	17-28-29	1,983	sd. sh. drlg.
C. C. M. Oil, No. 1-31 Kern, Coffee Canyon, Kern	31-27-29	1,027	wet; abd.
Combs Bros., No. 1 Kern, Kern River, Kern	28-28-28	521	pump 10 b.d.
D. B. K. Co., No. 2 Kern, Kern River, Kern	34-28-28	340	O.S. drlg.
Italo Pet., No. 1 Judkins, Kern River, Kern	19-28-28	1,211	sd. sh. drlg.
Triad Oil, No. 1 A.H.S., Kern River, Kern	19-28-28	1,199	cleaning out
Ring Oil, No. 6 Shapiro, Mount Poso, Kern	32-26-28	1,690	sd. sh. drlg.
Shell Oil, No. 1 Glide, W. Mount Poso, Kern	29-27-28	2,508	sd. sh. drlg.
Oils, Inc., No. 1 Cauley, Edison, Kern	16-30-29	4,197	cleaning out
Superior Oil, No. 1 Jewett, Arvin, Kern	16-31-29	4,496	sd. sh. drlg.
Texas Co., No. 35-1, KCL, Fruitvale, Kern	35-28-26	8,660	sd. sh. drlg.
Western-Gulf Oil, No. 1, KCL, Fruitvale, Kern	14-28-27	3,200	sd. sh. drlg.
Pacific Southwest Oil, No. 1 Dillon, Fruitvale, Kern	27-29-27	3,902	sd. sh. drlg.
Standard Oil, No. 2 Mushrush, Wasco, Kern	7-27-24	13,124	O.S. drlg.
Standard Oil, No. 8-2-B, KCL, Wasco, Kern	17-27-24	11,870	hd. sd. drlg.
Union Oil, No. 36-1, KCL, Shafter, Kern	36-27-24	10,230	sd. sh. drlg.
Cal. Expl., No. 1 Dougherty-Salisbury, Buttonw., Kern	7-29-24	11,771	coring
General Pet., No. 2 Van Ness, Rio Bravo, Kern	2-29-25	3,146	sd. sh. drlg.
General Pet., No. 1 Caldwell, Rio Bravo, Kern	35-28-25	10,990	sd. sh. drlg.
Shell Oil, No. 23-2-A, KCL, Rosedale, Kern	2-29-26	9,450	sd. sh. drlg.
Standard Oil, No. 2 Fleishauer, Greeley, Kern	20-29-26	11,900	P.B. 11,575
Standard Oil, No. 11-16, KCL, Greeley, Kern	20-29-26	10,870	hd. sd. drlg.
Standard Oil, No. 11-17, KCL, Greeley, Kern	18-29-26	10,340	hd. sd. drlg.
Standard Oil, No. 12-6, KCL, Greeley, Kern	30-29-26	9,594	br. sh. drlg.
Standard Oil, No. 1 Elrich, Greeley, Kern	20-29-26	12,976	fish D.P.
Superior Oil, No. 12, KCL, Greeley, Kern	3-30-26	13,150	P.B. 11,275
Shell Oil, No. 81-26-A, KCL, Ten Section, Kern	26-30-25	8,190	O.S. drlg.
Shell Oil, No. 23-14-A, KCL, Canal, Kern	14-30-25	8,340	O.S. drlg.
Shell Oil, No. 87-4-B, KCL, Canal, Kern	4-30-25	12,840	sd. sh. drlg.
Ohio Oil, No. 11-E, KCL, Canal, Kern	14-30-25	5,597	sd. sh. drlg.
Richfield Oil, No. 52-32-A, KCL, Tupman, Kern	32-30-25	8,660	O.S. drlg.
Union Oil, No. 1-11, KCL, Coles Levee, Kern	11-31-25	9,685	O.S. drlg.
Standard Oil, No. 20-1, KCL, Coles Levee, Kern	9-31-25	8,470	sd. sh. drlg.
Ohio Oil, No. 2-F, KCL, Coles Levee, Kern	10-31-25	9,653	O.S. drlg.
Premier-Padran Oil, No. 1 Sunset, Midw.-Sunset, Kern	25-32-23	1,737	sd. sh. drlg.
Vista Grande Oil, No. 1 Schultz, Midway-Sunset, Kern	36-32-23	3,630	redrlg. 3,370
Fried, Julius, No. 1 Fried, Midway-Sunset, Kern	34-32-24	5,035	recmtd. 4,400
National Oil, No. 32 Midway, Midway-Sunset, Kern	35-32-23	2,050	br. sh. drlg.
Texas Co., No. 33 Sunset, Midway-Sunset, Kern	32-32-24	3,183	pump 40 b.d.
Standard Oil, No. 7-29 Western, McKittrick, Kern	7-30-22	2,347	P.B. 2,325
Gates, F. E., No. 2 Laymance, McKittrick, Kern	20-30-22	394	sd. sh. drlg.
Westco Pet., No. 1 West, McKittrick, Kern	34-30-22	6,496	sd. sh. drlg.
Shell Oil, No. 8-32-1-A, KCL, San Emidio, Kern	32-11-22	1,987	sd. sh. drlg.
Tide Water A. O., No. 2 S.P., Tejon Ranch, Kern	15-11-19	7,326	dry; abd.
Petrol Corp., No. 33-5 Reserve, Tejon Ranch, Kern	33-11-19	8,946	fish D.P.
Progressive Oil, No. 3, E. Coalinga, Fresno	20-19-15	868	sd. sh. drlg.
Foreign Oil, No. 6 Annex, W. Coalinga, Fresno	6-21-15	2,488	cmtd. 2,360
Kolinga Refining, No. 2 Hill, W. Coalinga, Fresno	14-20-14	1,090	sd. sh. drlg.
Tyler & Cornwell, No. 4 Tyler, W. Coalinga, Fresno	14-20-14	270	sd. sh. drlg.
Ramsey, W. E., No. 2 Fearon, W. Coalinga, Fresno	18-20-15	4,835	will deepen
Rylatt, Harry, No. 3 Kipling, W. Coalinga, Fresno	26-20-14	1,175	deepening
Amerada Pet., No. 7-17-S.P.L., N. Coalinga, Fresno	17-19-16	7,440	br. sh. drlg.
Petseahon, No. 31-7-F, S.E. Coalinga, Fresno	7-20-16	5,528	redrlg. 4,196
Petseahon, No. 35-7-F, S.E. Coalinga, Fresno	7-20-16	7,328	flow 3,000 b.d
Petseahon, No. 22-18-F, S.E. Coalinga, Fresno	18-20-16	7,276	O.S. drlg.
Texas Co., No. 1 fee, S.E. Coalinga, Fresno	6-20-16	6,000	sd. sh. drlg.
Standard Oil, No. 71-13-C fee, S.E. Coalinga, Fresno	13-20-15	6,750	br. sh. drlg.
Standard Oil, No. 73-13-C fee, S.E. Coalinga, Fresno	13-20-15	5,671	sd. sh. drlg.
Superior Oil, No. 3 fee, S.E. Coalinga, Fresno	7-20-16	7,630	fish D.P.
Superior Oil, No. 4 fee, S.E. Coalinga, Fresno	7-20-16	7,704	br. sh. drlg.
K. N. D. A., No. 54-24-H, Kettleman North, Fresno	24-21-16	10,160	sd. sh. drlg.
K. N. D. A., No. 47-16-Q, Kettleman North, Kings	16-22-18	7,282	br. sh. drlg.
K. N. D. A., No. 4-18-Q, Kettleman North, Kings	18-22-18	3,994	sd. sh. drlg.
K. N. D. A., No. 36-18-Q, Kettleman North, Kings	18-22-18	7,790	br. sh. drlg.
K. N. D. A., No. 6-22-Q, Kettleman North, Kings	22-22-18	5,787	sd. sh. drlg.
K. N. D. A., No. 78-22-Q, Kettleman North, Kings	22-22-18	7,960	cleaning out
Standard Oil, No. 56-1-P, Kettleman North, Kings	1-22-17	8,228	gr. sd. drlg.
Standard Oil, No. 61-11-P, Kettleman North, Kings	11-22-17	6,284	will deepen
Standard Oil, No. 76-7-Q, Kettleman North, Kings	7-22-18	8,000	hd. sd. drlg.
Standard Oil, No. 52-17-Q, Kettleman North, Kings	17-22-18	2,173	sd. sh. drlg.
Standard Oil, No. 74-17-Q, Kettleman North, Kings	17-22-18	5,814	br. sh. drlg.
Standard Oil, No. 81-19-Q, Kettleman North, Kings	19-22-18	5,970	fish D.P.
Standard Oil, No. 41-21-Q, Kettleman North, Kings	21-22-18	5,460	br. sh. drlg.
Standard Oil, No. 83-21-Q, Kettleman North, Kings	21-22-18	5,581	cmtd. 5,575
Cal. Pet. Prod., No. 1 Irons, Cuyama, S. Luis Obispo	19-10-24	1,830	redrlg. 1,824
Newton, S. M., No. 1 Stafford, Panorama, S. L. Obispo	18-31-21	998	fish D.P.
Epco, Inc., No. 1 Ajax, Union, San Luis Obispo	27-26-13	4,750	br. sh. drlg.
Texas Co., No. 1 Arroyo Seco, Greenfield, Monterey	11-19- 5	2,145	sd. sh. drlg.

IMPORTANT WELLS AND SOUTHERN CALIFORNIA WILDCATS

Company, well, location, and county—	S. T. R.	Depth	Status—
Texas Co., No. 1 Anderson, Ocean Park, L. A.	17- 2-15	7,336	dry; abd.
A. B. C. Oil, No. 1 Angelich, Torrance, L. A.	23- 4-14	5,200	tested wet
Alford Oil, No. 14 Lomita, Torrance, Los Angeles	23- 4-14	5,187	flow 570 b.d.
Century Oil, No. 1 Smith, Torrance, Los Angeles	23- 4-14	5,160	sd. sh. drlg.
Cinco Oil, No. 1 Woodruff, Torrance, Los Angeles	23- 4-14	3,600	redrlg. 3,550
Campeet Oil, No. 17-A Kleinmyer, Torrance, L. A.	23- 4-14	5,380	sd. sh. drlg.
Critton & Colvin, No. 1 Clark, Torrance, Los Angeles	23- 4-14	5,168	flow 195 b.d.
Deep Hole Drlg., No. 2 Kovell, Torrance, Los Angeles	23- 4-14	5,217	P.B. 5,000
Elliott, D. W., No. 9 Kettler, Torrance, Los Angeles	23- 4-14	3,870	redrlg. 3,440
Garner-Johnson Oil, No. 2 Bush, Torrance, L. A.	23- 4-14	5,175	O.S. drlg.
Golden Bear Oil, No. 1 Goemarey, Torrance, L. A.	23- 4-14	5,171	flow 560 b.d.
Hydrocarbon Prod., No. 1 Duchess, Torrance, L. A.	23- 4-14	5,165	O.S. drlg.
Kildumac Oil, No. 1 Mitchell, Torrance, Los Angeles	23- 4-14	4,896	sd. sh. drlg.
King Pet., No. 1 Port, Torrance, Los Angeles	23- 4-14	2,992	sd. sh. drlg.
Lebow-McNee Oil, No. 1-B Kettler, Torrance, L. A.	23- 4-14	4,950	O.S. drlg.

KEY TO ABBREVIATIONS USED IN DRILLING REPORTS

Abd., abandoned.
Acd., acidized.
B.O., barrels of oil.
B.P.D., barrels per day.
B.D., barrels daily.
B.P., back pressure.
B.R., building rig.
B. ck., bottom choke.
Br. sh., brown shale.
B.S., basic sediment.
C.&P., cellar and pits.
Cd. or Crd. cored.
C.D., correct depth.
Cg., coring.
Cmtd., cemented.
C.O., cleaning out.
Comp., completed.
Compr., compressor.
C.P., casing pressure, also cement through perforations.
Csg., casing.
D.D., drilling (or drilled) deeper.
Drlg. or Drg., drilling.
Drk. or Dk., derrick.
D.S., drill stem.
D.S.T., drill stem test.
D.&A., dry and abandoned.
Fsg., fishing.
Gbo., gumbo.
G.I., gas injection.
Gr., gravity.
Gr. sd., gray sand.
Grn. sh., green shale.
Hd. sd., hard sand.
H.F.W., hole full of water.
I.P., initial production.
L., lime.
L.D.D., later drilled deeper.
Lnr., liner.
Loc., location.
M.I.M., moving in material.
M.I.R., moving in rig.
M.I.R.T., moving in rotary tools.
M.O.T., milling on tools.
O.I.H., oil in hole.
O.S., oil sand.
O.T.D., old total depth.
O.W.D.D., owell drilling deeper.
O.W.P.B., old well plugging back.
P.B., plugging back.
P.B.P., pulling or pulled big pipe.
P.L., pipe line.
P.L.O., pipe line oil.
Pmpg., pumping.
P.O.P., putting on pump.
P.P., pulled pipe.
Rd. sd., red sand.
Rd. sh., red shale.
Recmt., recemented.
Recvd., recovered.
Rmg., reaming.
Redrlg., redrilling.
Rng., running.
R.O.G., rig on ground.
R.P., rock pressure.
R.U., rigging up.
R.U.R., rigging up rotary.
R.U.S.T., rigging up standard tools.
R.&T., rods and tubing.
S. or Sd., sand.
S.D., shut down.
Sdy. sh., sandy shale.
Sdtrk. or St., sidetracking.
S.D.P.L., shut down for pipe line.
S.D.O., or S.D.W.O., shut down awaiting orders.
S.G., show gas.
Sh.&L., shale and lime.
S.I., shut in.
S.I.P., shut in, prorated.
S.L.M., steel line measurement.
S.O., show oil.
S.O.G.&W., show of oil, gas and water.
Spdg. or Spd., spudding.
S.R., straightreaming.
Stdg., standardizing (also standing)
S.W., salt water.
Swbg., swabbing.
T.A., temporarily abandoned.
Tbg., tubing.
T.D., total depth.
T. ck., top choke.
T.P., tubing pressure.
Tr., tract.
Tstd., tested.
U.R., underreaming.
W.I.H., water in hole.
W.O., workover.
W.O.C., or W.O.C.S., waiting on cement to set.
W.O.O., waiting for orders.
W.P., working pressure.
W.S.O., water shutoff.
W.S.S.O.K., water shutoff O.K.
W.S.R. or W.O.S.R., awaiting standard rig.
Wtr., water.

Lone Star Drlg., No. 1 Pestor, Torrance, Los Angeles	23-	4-14	5,062	O.S. drlg.
Main Oil, No. 1 Lomita, Torrance, Los Angeles	23-	4-14	2,895	sd. sh. drlg.
McCaslin, W. E., No. 1 Robertson, Torrance, L. A.	23-	4-14	4,897	sd. sh. drlg.
Pacific West. Oil, No. 7 Marble, Torrance, L. A.	15-	4-14	4,990	redrlg. 4,830
Packard Oil, No. 1 Pollard, Torrance, Los Angeles	23-	4-14	2,945	sd. sh. drlg.
Peters Roy. Corp., No. 1 Bass, Torrance, Los Angeles	23-	4-14	4,890	cleaning out
Rilling & Co., No. 1 H. & H., Torrance, Los Angeles	23-	4-14	4,760	sd. sh. drlg.
Standard Oil, No. 1-11 Marble, Torrance, Los Angeles	22-	4-14	3,825	rigged up
Symbol Oil, No. 3 Lomita, Torrance, Los Angeles	23-	4-14	3,121	sd. sh. drlg.
Sunset Oil, No. 1 La Salle, Torrance, Los Angeles	23-	4-14	5,202	tested wet
Vesta Pet., No. 1 Bruhn, Torrance, Los Angeles	23-	4-14	5,171	O.S. drlg.
Woolner Oil, No. 7 Lomita, Torrance, Los Angeles	23-	4-14	5,139	pump 85 b.d.
Wilson, Ray, No. 3 Lomita, Torrance, Los Angeles	23-	4-14	5,179	sd. sh. drlg.
Whit. S. F. S. Synd., No. 1 Mertz, Torrance, L. A.	23-	4-14	4,897	sd. sh. drlg.
C. C. M. O., No. 41 Lomita, Torrance, Los Angeles	15-	4-14	4,922	sd. sh. drlg.
C. C. M. O., No. 49 Lomita, Torrance, Los Angeles	15-	4-14	3,735	will deepen
C. C. M. O., No. 12 Kettler, Torrance, Los Angeles	14-	4-14	3,825	rigged up
General Pet., No. 14 Poggi, Harbor City, L. A.	30-	4-13	2,965	sd. sh. drlg.
Texas Co., No. 4 Oakley, Harbor City, Los Angeles	30-	4-13	5,200	flow 246 b.d.
Union Oil, No. 66 Callender, Dominguez, L. A.	33-	3-13	6,870	flow 890 b.d.
Union Oil, No. 67 Callender, Dominguez, L. A.	33-	3-13	3,486	sd. sh. drlg.
Union Oil, No. 11 Carson, Dominguez, L. A.	33-	3-13	7,040	sd. sh. drlg.
Union Oil, No. 49 Hellman, Dominguez, L. A.	33-	3-13	9,474	cleaning out
Shell Oil, No. 27-A Reyes, Dominguez, L. A.	33-	3-13	4,075	will deepen
Barnsdall Oil, No. 12 Rosecrans, Rosecrans, L. A.	20-	3-13	7,670	flow 250 b.d.
Metcalfe Oil, No. 1 Bradford, Rosecrans, L. A.	20-	3-13	7,678	sd. sh. drlg.
Union Oil, No. 31 Rosecrans, Rosecrans, L. A.	19-	3-13	7,610	sd. sh. drlg.
Universal Consd., No. 15 Trust, Rosecrans, L. A.	18-	3-13	4,484	sd. sh. drlg.
Bankline Oil, No. 1 Kirby, Rosecrans, L. A.	19-	3-13	7,653	cleaning out
Basin Oil, No. 4 Club, Potrero, Los Angeles	34-	2-14	4,822	sd. sh. drlg.
Barnsdall Oil, No. 5 R.S.F., Newhall, L. A.	26-	4-17	7,103	flow 1,200 b.d.
Standard Oil, No. 1 Ward, Aliso Canyon, L. A.	27-	3-16	4,096	hd. sh. drlg.
Tide Water A. O., No. 2 Porter, Aliso Canyon, L. A.	27-	3-16	4,490	hd. sh. drlg.
Union Oil, No. 1-27 Orcutt, Aliso Canyon, L. A.	27-	3-16	3,674	sd. sh. drlg.
Mangrum & Page, No. 1 Lintz, Newhall, L. A.	4-	3-15	240	sd. sh. drlg.
General Pet., No. 35 Harbor, Wilmington, L. A.	2-	5-13	2,535	sd. sh. drlg.
General Pet., No. 2 P.E., Wilmington, L. A.	2-	5-13	4,120	O.S. drlg.
Bond Pet., No. 2 Mutual, Wilmington, L. A.	35-	4-13	3,230	sd. sh. drlg.
Dunlap Oil, No. 3-D-U.P., Wilmington, Los Angeles	3-	5-13	3,002	sd. sh. drlg.
F. A. Pet., No. 1 Franco, Wilmington, Los Angeles	29-	4-13	3,725	cleaning out
Getty, G. F., Inc., No. 8-W, Wilmington, Los Angeles	33-	4-13	3,595	redrlg. 3,590
Haines, A., No. 1 Harbor, Wilmington, Los Angeles	35-	4-13	3,047	flow 145 b.d.
Richfield Oil, No. 25 P.D., Wilmington, Los Angeles	2-	5-13	2,800	sd. sh. drlg.
Signal O. & G., No. 1 Allen, Wilmington, L. A.	2-	5-13	3,761	sd. sh. drlg.
Signal O. & G., No. 1-D, L.B.-U.P., Wilmington, L. A.	3-	5-13	4,194	O.S. drlg.
Signal O. & G., No. 2-D, L.B.-U.P., Wilmington, L. A.	3-	5-13	4,063	O.S. drlg.
Signal O. & G., No. 2 L.B.-P.D., Wilmington, L. A.	2-	5-13	3,390	sd. sh. drlg.
Union Pacific R. R., No. 101, Wilmington, L. A.	34-	4-13	3,290	O.S. drlg.
Union Pacific R. R., No. 107, Wilmington, L. A.	3-	5-13	3,998	O.S. drlg.
Union Pacific R. R., No. 108, Wilmington, L. A.	4-	5-13	4,030	O.S. drlg.
Universal Consd., No. 8 Newport, Wilmington, L. A.	2-	5-13	3,080	sd. sh. drlg.
Vulcan Oil, No. 469-1 Gilmore, Wilmington, L. A.	33-	4-13	5,575	P.B. 5,371
Westgate Greenland Oil, No. 5-A, Wilmington, L. A.	3-	5-13	3,915	O.S. drlg.
Ridge Oil, No. 1 Club, Montebello, Los Angeles	3-	2-12	4,191	sd. sh. drlg.
St. Helens Pet., No. 30 Monterey, Montebello, L. A.	2-	2-12	7,275	cmtd. 7,275
St. Helens Pet., No. 2 Eggleston, Montebello, L. A.	2-	2-12	5,976	sd. sh. drlg.
St. Helens Pet., No. 4 Mulholland, Montebello, L. A.	2-	2-12	6,960	O.S. drlg.
Standard Oil, No. 5 Braun, Montebello, L. A.	2-	2-12	7,030	sd. sh. drlg.
Standard Oil, No. 2 Kaufman, Montebello, L. A.	2-	2-12	7,260	O.S. drlg.
Standard Oil, No. 2 Harvey, Montebello, L. A.	2-	2-12	7,140	sd. sh. drlg.
Standard Oil, No. 4 Harvey, Montebello, L. A.	2-	2-12	6,673	milling 6,318
Standard Oil, No. 5 Whitehead, Montebello, L. A.	3-	2-12	3,494	sd. sh. drlg.
Union Oil, No. 30 La Merced, Montebello, L. A.	1-	2-12	8,264	sd. sh. drlg.
Stanley Oil, No. 1 Montebello, Montebello Los Angeles	2-	2-12	6,897	sd. sh. drlg.
Texas Co., No. 5 Mulholland, Montebello, L. A.	2-	2-12	6,498	sd. sh. drlg.
Traders Oil, No. 1 Extension, Montebello, L. A.	2-	2-12	3,451	sd. sh. drlg.
Graham & Loftus, No. 1 Coffman, Montebello, L. A.	2-	2-12	5,491	sd. sh. drlg.
Vulcan Oil, No. 1 Calkins, Montebello, Los Angeles	11-	2-12	4,284	sd. sh. drlg.
Herley-Kelly, Inc., No. 2 Burke, Montebello, L. A.	2-	2-12	7,230	flow 680 b.d.
Wood-Callahan Oil, No. 1 Harris, Montebello, L. A.	2-	2-12	4,990	sd. sh. drlg.
Bush Oil, No. 1 Olds, Montebello, Los Angeles	3-	2-12	3,784	fish D.P.
McVicar & Rood, No. 1 Manz, Montebello, L. A.	2-	2-12	7,230	flow 570 b.d.
Partridge, C. W., No. 1 Hillside, Whittier, L. A.	22-	2-11	1,162	sd. sh. drlg.
H. & C. Oil, No. 1 Joyce, Whittier, Los Angeles	22-	2-12	3,603	sd. sh. drlg.
Texas Co., No. 1-13-A Smith, Anaheim, Orange	8-	4-10	8,440	sd. sh. drlg.
Standard Oil, No. 68 Emery, W. Coyote, Orange	24-	3-11	4,120	sd. sh. drlg.
Southwest Expl., No. 9 State, Hunt. Beach, Orange	4-	6-11	4,375	pump 310 b.d
Southwest Expl., No. 10 State, Hunt. Beach, Orange	4-	6-11	4,150	O.S. drlg.
Southwest Expl., No. 11 State, Hunt. Beach, Orange	4-	6-11	2,997	sd. sh. drlg.
Dragon Oil, No. 1 Jauman, Hunt. Beach, Orange	36-	5-11	4,625	pump water
Texas Co., No. 10 Brown, Huntington Beach, Orange	11-	6-11	3,784	P.B. 3,440
Patos Drlg., No. 1 Graham, Sunset Beach, Orange	21-	5-11	5,429	will deepen

KANSAS

Week Ending March 25 (Descriptions are East unless marked otherwise)

Barber County

Barbara Oil Co. No. 1 Wilson, C SE Sec. 17-33-13. Arb. 5,180-89 ft.; S. W. to P.B.
Olson Oil Co. No. 1 Coffman, C NW NE Sec. 25-31-12w. Vla. 4,512 ft.; Simp. 4,600 ft.; Arb. 4,800-50 ft., T.D.; set 5-in. csg. 4,620 ft.; W.O.C.

Barton County

Central Pet. and Vernon O. & G. No. 1 Miller, SE SW SE Sec. 17-16-13w. Drlg. 2,975 ft.
R. E. Day et al No. 1 Feltes, SE SE NE Sec. 14-16-12w. O.W.D.D.; drlg. 2,250 ft.
Gulf Oil Corp. No. 1 Dolecheck, CNL NE SW Sec. 24-16-12w. Drlg. 2,730 ft.
Gulf Oil No. 1 Louis, C N½ NW SW Sec. 2-20-12w. Arb. 3,347 ft.; S.S.O. 3,-373 ft.; T.D. 3,386 ft.; S.O.
Long & Johnson No. 1 Eveleigh, SW SW NE Sec. 3-18-14w. Lans. 3,100 ft.; Arb. 3,338 ft.; T.D. 3,371 ft.; reset 5-in. 3,355 ft.; W.O.C.
Paul Martin No. 1-A Feltes, NW SW SE Sec. 8-16-12w. T.D. 2,900 ft.; F. 20 B. O.P.H.; pulling big pipe.
I. W. Murfin No. 1 Birzer, NE SW Sec. 21-19-11w. Pay 3,130 ft. and 3,152-54 ft.; pulling tbg.; to swb.
York State Oil Co. No. 1 Marchand, CEL NE NE Sec. 24-20-12w. Arb. 3,308 ft.; drlg. 3,245 ft.

Butler County

Bowland & McCoy No. 1 Frankson, SE SW Sec. 2-29-6. S.D. 185 ft.
C. L. Carlock et al No. 1 Hartenbower, NW NW NW Sec. 16-29-6. Drlg. 475 ft.
Hay, Hall & Table-Mesa Oil Co. No. 1 Ferrell, SW NW NE Sec. 28-28-8. Top pay 2,685 ft.; T.D. 2,680 ft.; 450 ft. O.I.H.; acd.

Cowley County

Lloyd, Frost & Study No. 1 Jones, CEL W½ E½ Sec. 2-31-3. Drlg. 2,925 ft.
Ben Gralapp et al No. 1-A Clark, NW NW NE Sec. 11-31-3e. T.D. 3,248 ft.; P.B. 3,000 ft.; fag. 3,200 ft. in new hole.

Dickinson County

Franks et al No. 1 Huffman, NW NW SW Sec. 11-13-1. S.D. 2,320 ft.

Ellis County

Fred Smith No. 1 Werth, SW SW SE Sec. 33-15-18w. Rotary rig.

Graham County

Continental Oil Co. No. 1 Putnam Inv. Co., CWL SW Sec. 23-9-21w. Arb. 3,-765 ft.; S.O.; R.U.S.T.

Leavenworth County

John Hardaway No. 1 Scheller, SW SE SW Sec. 30-10-22. S.D. 345 ft.

McPherson County

Marylyn Oil No. 1 Dixon, NW NE NW Sec. 7-19-2w. T.D. 3,019½ ft.; P. 15 B. O.P.D.
Phillips Pet. Co. No. 1 Esau, CEL W½ NE Sec. 7-21-4w. Arb. 3,992 ft.; T.D. 4,012 ft.; D.&A.
Sinclair Prairie No. 1 Martins, CWL SW Sec. 20-21-3w. Arb. 3,893-3,910 ft., T.D.; S.D.O.

Marion County

Johnson et al No. 1-A Miltz, SW SW SW Sec. 24-17-4. T.D. 2,485 ft.; S.O. 2,362 ft. and 2,390-2,400 ft., T.D.; C.O.

Mead County

Pacific Midwest Oil No. 1 Rexford, NE SE SW Sec. 8-30-29w. S.D. 1,435 ft.

Ness County

Oriental Oil Co. No. 1 Beardslee, NE NE NE Sec. 21-18-25w. Rotary rig.

Osage County

J. M. Edwards No. 1 Detrick (O.W.D.D.), C NW SE Sec. 21-14-15. O.T.D. 1,200 ft.; U.R. 8-in. csg.

Ottawa County

Babcock Oil No. 1 Copeman, NW NW Sec. 18-10-2w. Miss. 2,835 ft.; H.F.W. 3,302-10 ft.; S.D. for csg. 3,480 ft.

Pratt County

Champlin Ref. Co. No. 1 Elliott, SW NE Sec. 26-27-14w. Fsg. 4,857 ft.

Rice County

McPherson Drlg. Co. No. 1 Cramm, SE SE SW Sec. 15-19-9w. Drlg.
Phillips Pet. Co. No. 1 Proffitt, CEL NE NE Sec. 8-20-9w. Drlg. 1,787 ft.
Spurrier & Bruce No. 1 Cary, NE NW NW Sec. 30-18-8w. O.W.D.D.; O.T.D. 1,530 ft.; S.D. 1,680 ft.

Russell County

Central Pet. No. 1 Karst, SE NW NE Sec. 21-15-13w. Drlg. 3,235 ft.
Phil-Han Oil Co. No. 1 Hill, SE SW SW Sec. 16-14-14w. Spd.
Skelly Oil Co. No. 1 Carter, CSL SW NE Sec. 33-14-13w. 1st pay 2,847 ft.; 2nd pay 2,861 ft.; S.O.; acdz.; tstg.; T.D. 2,869 ft.

Saline County

Central States Oil Co. No. 1 Crawford, NW SW NE Sec. 26-13-3w. S.D. 1,125 ft.

Sedgwick County

Century Pet. Co. No. 1 Wilke, SW SE SW Sec. 1-29-2. S.D. 800 ft.

Shawnee County

W. M. McKnab No. 1 Fritz, SW SE NW Sec. 4-12-14. Miss. 1,901 ft.; H.F.W. 1,-960 ft.; S.D. 2,160 ft.
W. M. McKnab et al No. 1 Spurgeon, SE SW SE Sec. 28-10-15. M.I.M.

Stafford County

Virginia Drlg. Co. No. 1 Schlockter-meyer, SE NW Sec. 7-21-11w. Arb. 3,-469 ft.; H.F.W. 3,575-80 ft.; S.D.O.

Wabaunsee County

Scheu & Tague et al No. 1 Ave, NW SW NW Sec. 10-12-8. C.O. 725 ft.

Woodson County

Roby et al No. 1 Meairs, SW SW NW Sec. 21-25-14. C.O. 400 ft.
M. J. Trott No. 1 Abbott, NW NE NE Sec. 21-25-14e. Drlg. 1,325 ft.

MISSOURI

Clay County

Eastern Drlg. Co. No. 1 Williams, NW NW NE Sec. 28-53-32w. Surf. csg.
Frank Hopper et al No. 1 Black, NW NW NW Sec. 36-52-32w. Rig.

Holt County

J. H. Everitt et al No. 1 Spring, SW SW SE Sec. 30-62-38w. S.G. 500 ft.; drlg. ahead.
Markham et al No. 1 Gaffney, SW SE SW Sec. 24-63-40w. M.I.M.

Sullivan County

H. V. Elwell No. 1 Taylor, CEL NW Sec. 12-62-21w. Rig.

OKLAHOMA

Week Ending March 25

NORTHERN OKLAHOMA

Atoka County

Giblett No. 1 Rich, SE SE SW Sec. 2-1-12. W.O.C. 704 ft.

Beckham County

H. C. McLaughlin et al No. 1 Durham, C SW Sec. 36-8-24w. Drlg. 900 ft.

Cleveland County

Nels-Burrton No. 1 Hirsch, NW NW NE Sec. 17-9-2w. O.W.P.B.; O.T.D. 7,692 ft.; T.D. 7,695 ft.; acd.; p. 280 B.O. and 500 B.W.; to re-acd.

Comanche County

Ker-Lyn Oil Co. No. 1 Laging, C NE SW Sec. 30-4-9w. Drlg. 6,240 ft.
Mid Night Oil No. 1 Howe, NW NW NE Sec. 30-2-13w. O.W.D.D.; O.T.D. 703 ft.; T.D. 773 ft.; S.D.
Ed Parsons No. 1 Stephens, C NW SW Sec. 29-4-9w. Drlg. 300 ft.

Ellis County

Enterprize Drlg. Co. No. 1 Wahl, SE NW NW Sec. 1-19-25w. Drlg. 305 ft.

Garfield County

Champlin Ref. Co. No. 1 Allen, SE SE SE Sec. 26-24-8w. 2nd Wlx. 7,070 ft.; T.D. 7,110 ft.; D.&A.
Continental Oil Co. No. 1 Luedtman, C SW SE Sec. 2-21-4w. Drlg. 1,475 ft.
Hughes Drlg. Co. No. 1 Meisner, C NE NW Sec. 10-20-4w. 2nd Wlx. 5,915 ft.; T.D. 5,921 ft.; est. 500 B.O.P.D.; S.I.

Garvin County

Ker-Lyn Oil Co. No. 1 Butterly, NE NE SE Sec. 22-1-1. O.W.D.D.; O.T.D. 3,-205 ft.; to D.D.
Pure Oil No. 1 Derdeyn, NE NW SE Sec. 19-3-1. Rec. S.W. at 3,739 ft.

Grady County

Carter Oil Co. et al No. 1 Smith C-58, C SE SW Sec. 26-5-8w. S.S.O. 5,329-58 ft.; S.O. 5,433 ft.; cd. 5,964-76 ft.; rec. sh.; cd. 6,351-76 ft.; rec. hd. sd.; T.D. 6,613 ft.; set 9-in. csg. 6,602 ft.; W. O.C.
Ed Parsons No. 1 McKenney, SE SE SW Sec. 30-3-8w. Drlg. 3,700 ft.

Hughes County

Skelton et al No. 1 Gilmore, C N½ NE SE Sec. 7-5-9. Drlg. 716 ft.

Jackson County

English & Morgan No. 1 Lee, NW NW SE Sec. 36-2-19w. Drlg. 980 ft.

Kay County

Cooper Drlg. Co. No. 1 Caughlin, SE NE SW Sec. 30-25-1. T.D. 135 ft.; R.U.R.
Crawford No. 1 Bethel, SE SE NW Sec. 34-27-2w. T.D. 1,040 ft.; S.D.
Kaw Oil Co. No. 1 Wolfenbarger, NW NW SE Sec. 9-27-4. T.D. 60 ft.; abd.

Kingfisher County

K. A. Ellison No. 1 Baker, NE NE SE Sec. 20-19-5w. Drlg. 4,980 ft.
Ace Gutowsky No. 1 Lankford, NE NE SE Sec. 34-17-6w. Miss. 7,014 ft.; drlg. 7,270 ft.

Kiowa County

C. J. Hagerling No. 1 Kimray, SW SW NW Sec. 36-5-18w. Drlg. 720 ft.
Wichita Oil, Inc., No. 1 Mace, SW SW SW Sec. 11-5-15w. S.D. 127 ft.

McIntosh County

Scruggs et al No. 1 Lanning, SE SW SW Sec. 19-12-15. Spd.

Murray County

M. A. Saunders No. 1 Vanderslice, C SW SW Sec. 25-2-2. Drlg. 1,840 ft.

Muskogee County

Petroleum No. 1 Scott, SE SW SW Sec. 14-13-19. Mch.

Okfuskee County

Carter & Hight No. 1 Rogers, SW SW SW Sec. 6-13-8. T.D. 2,850 ft.; P.B. 2,-498 ft.; P.O.P.
I. T. I. O. No. 1 Palmer, NE SE NW Sec. 5-10-9. T.D. 1,942 ft.; D.&A.

Oklahoma County

E. M. Eldridge No. 1 White, C NE NE Sec. 30-11-1. T.D. 6,395 ft.; moving in motor.
O. A. Walters No. 1 Olmstead, C E½ SE NW Sec. 12-14-3w. Set 13-in. 354 ft.; W.O.C.

Okmulgee County

Jim Wise Drlg. Co. No. 1 Morrow, SW NW NE Sec. 16-15-13. 3,000,000 cu. ft. gas 1,930-38 ft.; decreased to 1,000,000 cu. ft. at 1,985 ft.; T.D. 1,985 ft.; S.D.

Pawnee County

Ed Kelly No. 1 Hill, SW SW SE Sec. 1-21-5. Drlg. 2,210 ft.

Pittsburg County

Phillips Pet. Co. No. 1 Hubacker, C NW NE Sec. 11-7-15. Drlg. 5,988 ft.

Pontotoc County

Union Dev. Co. No. 1-A Abbott, SW NW NE Sec. 34-3-6. S.D. 4,100 ft.
L. Walker No. 1 King, SW SE NW Sec. 5-4-7. S.D. 617 ft.

Pottawatomie County

Grimes et al No. 1 Dye, NW NW SE Sec. 2-5-5. Wlx. 3,355 ft.; T.D. 3,379 ft.; S.D.O.
Johnson & Kimmitz No. 1 Billington, NW NW SE Sec. 8-7-5. Drlg. 3,997 ft.

Sequoyah County

Thompson Brs. No. 1 Ruby, NW NW NE Sec. 30-12-22. T.D. 1,050 ft.; rng. 8-in.

Seminole County

Atlantic Ref. Co. No. 1 Atkinson, NW NW SW Sec. 17-6-6. Misener 3,697 ft.; Vlo. 3,718 ft.; T.D. 4,023 ft.; P.B. 3,819 ft.; drld. out to 3,839 ft.; pmp. 17 B.O. and 164 B.W.; comp.

Atlantic Ref. Co. No. 1 Jimmey, SE NW NE Sec. 21-7-6. Spd.

Burke-Greis No. 1 Harjoche, NE NE SW Sec. 19-8-7. Wlx. 4,271 ft.; T.D. 4,295 ft.; S.D.O.

H. S. Moss No. 1 Leachman, C N½ SE NE Sec. 34-10-6. Woodford 4,252 ft.; Hntn. 4,303 ft.; T.D. 4,630 ft.; F. 1,561 B.O. in 18 hrs.; comp.

W. C. Wood No. 1 Aldridge, SW NW NE Sec. 5-8-8. T.D. 1,910 ft.; H.F.W.; S. D.O.

Stephens County

Phillips Pet. Co. No. 1 Culbertson, NW NW SE Sec. 4-1-5w. T.D. 5,593 ft.; est. 25 B.O.; moving out rotary tools.

Texas County

Republic Nat. Gas Co. No. 1 Dulabohn. C Sec. 21-6n-15ecm. Drlg. 2,365 ft.

Republic Nat. Gas Co. No. 1 Judd, CSL SW Sec. 24-6n-15ecm. T.D. 2,870 ft.; gas 7,100,000 cu. ft.

Washita County

Continental Oil Co. No. 1 Proctor, C NW Sec. 28-10-20w. Drlg. 10,516 ft.

L. B. McWhirter No. 1 fee, NW SW SW Sec. 34-8-19w. T.D. 2,190 ft.; S.D.

SOUTHERN OKLAHOMA

Carter County

Pure Oil Co. No. 1 Noble, NE SE Sec. 35-3s-1e. Cd. 6,394-98 ft.; rmg. down.

Choctaw County

Clyde Ross et al No. 1 Hardy, SE SE NW Sec. 21-7s-15. S.D. 1,408 ft.

Jefferson County

H. W. Weir No. 1 Carmichael, NE NE SW Sec. 23-7s-7w. W.O.C. 102 ft.

Marshall County

Hughes et al No. 1 Vittitto, C NE SE Sec. 11-5s-4e. O.W.D.D.; O.T.D. 7,100 ft.; S.D.O.

Murray County

A. G. Carter No. 1 Vensonite, 1,170 ft. W and 150 ft. S, Sec. 34-1s-2e. Drlg. 2,144 ft.

Tillman County

Smith No. 2 Hammel, NE NW NW Sec. 6-5s-15w. T.D. 2,627 ft.; S.D. for fuel.

ARKANSAS

Calhoun County

J. R. Lockhart No. 1 Southern Kraft Corp., SE cor. NW NW Sec. 17-14-13. O.W.W.O.; (formerly C. E. Murdock); cg. sd.&L. 4,287 ft.

Columbia County

Atlantic Ref. Co. No. 1 A. S. Crisp, NW cor. NW NE Sec. 23-17-20. T.D. 7,591 ft.; 7-in. csg. 7,593 ft.; perf. 7,518-75 ft.; T.D. 7,599 ft.; comp.; 108 B.P.H.; ½-in. ck.; T.P. 1,300 lbs.; C.P. 900 lbs.

Atlantic Ref. Co. No. 1-D L. Garrett, Sec. 24-17-20. Drlg. 1,300 ft.

Hassie Hunt No. 1 Tally, Sec. 14-17-20. Drlg. rd.&gr. sh. 4,955 ft.

Normandie Oil Co. No. 1-B L. Garrett, C NE SW Sec. 13-17-20. Set 16-in. csg. 120 ft.; T.D. 7,535 ft.; T. Smkvr. L. 7,-521 ft.; sat. cool. L. 7,535-75 ft.; 7-in. csg. 7,570 ft.; completing.

Phillips Pet. Co. No. 1 Askew Unit, C NE NW Sec. 4-17-21. Drlg. sdy. sh. 2,-580 ft.

Southwood Oil Co., Inc., No. 1-B L. Garrett, C SW NW Sec. 24-19n-7e. Drlg. 3,300 ft.

Southwood Oil Co. No. 1 L. A. Grelling, C NE NW Sec. 23-17-20. T.D. 3,790 ft.; set whipstock 2,906 ft.; drlg. in sidetracked hole 3,855 ft.

Southwood Oil Co., Inc., No. 2 Grelling, C SW NE Sec. 23-17-20. 16-in. csg. 150 ft.

Standard Oil Co. of La. No. 1 J. J. Gunnels Unit, NE cor. SE NE Sec. 16-17-19. Drlg. 2,014 ft.

Standard Oil Co. of La. No. 1 M. Harris. NE cor. NE SW Sec. 15-17-19. Drlg. sd. 5,627 ft.

Tide Water Oil Co. No. 1 Price, C NE SW Sec. 15-18-19. Drlg. rd.&gr. sh. 4,-764 ft.

Vaughn & Hunt No. 1 Crisp, Sec. 23-17-20. Cd. 5,722-32 ft.; rec. 9 ft. silty por. sd.; S.O.; D.S.T. 5,722-32 ft.; rec. 2,075 ft. mud; drlg. gr. sh. 5,950 ft.

Hot Spring County

John H. James No. 1 Sturgess Lbr. Co., SW cor. SW SE Sec. 24-6-18. 10-in. csg. 58 ft.; cd. hd. dense gr. L. 964-78 ft.; T.D. 1,048 ft.; S.O. reported 480-82 ft. and 819-21 ft.; hd. sd.; S.D.; W. O. core bbl.

Lafayette County

Standard Oil Co. of La. No. 5 McKean, SW cor. NW SE Sec. 7-16-22. Set 9⅝-in. csg. 2,047 ft.; drlg. sdy. sh. strks. hd. L. 6,030 ft.

Little River County

C. & M. Drlg. Co. No. 1 Strawn, SW cor. SE Sec. 20-10-32. Cd. 1,270-80 ft.; sh.& wtr. sd.; reported S.O. 1,365-70 ft.; 1,542-64 ft. sd. and 1,564-74 ft. sdy. L.; cor. T.D. 1,598 ft.; S.D.; arng. set csg.

Joe G. Strahan et al No. 2 Dierks Lbr. Co., Sec. 21-12-28. D.&A. 3,797 ft.

Lonoke County

Cabot Drlg. Club, Inc., No. 1 Benson Townsite, Sec. 18-4n-9w. O.W.W.O.; O. T.D. 2,760 ft.; R.U.

Lonoke-Prairie Dev. Co. No. 1 T. Young, C NW NW Sec. 8-3n-7w. Hole clean; U.R. 8¼-in. csg. 236 ft.; T.D. 300 ft., R.U. rotary tools.

W. L. Tedford No. 1 Anderson. 8-in. 400 ft.; arng. run 5-in. csg. on pkr. to S.O. wtr. flw.; set 5-in. csg. on pkr. reported 3-ft. sd. 937-40 ft.; bailed dry with S.O.; drld. to 942 ft. and bailed dry; acdzd. with 12 gal.; S.I. 943 ft.

Mississippi County

Benedum & Trees Oil Co. No. 1 Mack. 330 ft. SW cor. NW SW Sec. 2-15n-12e. Top Nac. 2,160 ft.; set 7-in. csg. 2,897 ft.; D.&A.; hd. gr. L. 4,535 ft.

Ouachita County

Phillips Pet. Co. No. 1 J. D. Reynolds, 330 ft. SE cor. SE NW Sec. 27-15-15. O.W.W.O.; O.T.D. 4,926 ft.; comp. as disc. well, Snow Hill field; drld. hd. dense ool. L. with salty taste to 4,945 ft. and pmpd. 1,200 bbls. S.W. daily, no S.O.; recmtd. and P.B. 4,695 ft.; perf. csg. 2,732-35½ ft., 2,728-31½ ft., 2,744-47½ ft., and 2,756-60 ft.; est. 2,-300 ft. fld. in hole., 1% oil; P.B. 2,770 ft.; W.O.C.

Union County—Schuler

E. M. Jones No. 3 J. C. Morgan, Sec. 13-18-18. Drlg. rd.&gr. sh. 4,333 ft.

E. M. Jones No. 4 J. C. Morgan, C N½ NE NW Sec. 13-18-18. Drlg. gr. sh. 3,-751 ft.

Lion Oil Ref. Co. No. 1 Clay, Sec. 12-18-18. Drlg. rd.&gr. sh. 5,717 ft.

Lion Oil Ref. Co. No. 1 Calloway, NE cor. SE SE Sec. 13-18-18. Drlg. gr. sr. 3,834 ft.

Lion Oil Ref. Co. No. 2 Henry, C N SE SE Sec. 12-18-18. Set 16-in. csg. 115 ft.; 10¾-in. csg. 1,920 ft.; T.D. 7,700 ft.; 7-in. csg. 7,688 ft.; W.O.C.

Lion Oil Ref. Co. No. 1 Murphy Ld. Co., Sec. 13-18-18. Drlg. rd. sdy. sh. 6,443 ft.

Phillips Pet. Co. No. 4 Brian, NE cor. NE SE Sec. 13-18-18. 10¾-in. csg. 2,092 ft.; W.O.C.

Phillips Pet. Co. No. 10 Sewell, C S½ Lot 4, SW Sec. 7-18-17. 10¾-in. csg. 2,-099 ft.

Union County—Other

Bradham & Anthony No. 3 M. H. Nash, NW cor. NE SW Sec. 7-17-13. S.W. sd.; S.O. 2,980-3,080 ft.; cg. ahead.

Goodwin & Markwick No. 1 Union Sawmill Co., C NW NW SE Sec. 13-18-18. Drlg. chk. 2,460 ft.

Oliphant Oil Co. No. 1 Union Sawmill Co., C SW NW Sec. 22-19-14. M.I. rig.

Sloan Wells, Tr., No. 4 G. J. Childs, 150 ft. NW cor. NE SW Sec. 8-16-16. O.W. W.O.; O.T.D. 2,656 ft.; fsg. 2,656 ft.

Snuggs Sebersky & Bylick No. 1 J. N. Jerry, NE cor. SE SW Sec. 21-17-14. Cd. S.W. sd. 2,818-24 ft.; S.O. 2,885-90 ft.; D.S.T. 2,881-95 ft.; 15 min.; rec. 250 ft. mud, S.W. and S.O.; cd. sd. 2,-993-98 ft. (oil) and 2,998-3,000 ft. (S. W.); S.D. 3,195 ft.; reported S.O. 2,666 ft.; P.B. 2,700 ft.; D.S. stk. 1,900 ft.

White County

G. F. Heriden et al No. 1 M. C. Wells, C SW Sec. 36-9n-8w. R.U.; W.O.

NORTH MISSISSIPPI

Calhoun County

L. C. Lucas No. 1 E. C. Boland, 400 ft. E and 500 ft. S, NW cor. SW Sec. 9-22n-9e. S.D. 791 ft.

Clarke County

Jeremiah L. Ryan et al No. 1 M. Eddins, 500 ft. SE cor. Sec. 29-2n-14e. S.D. 291 ft.

Hinds County

G. Jefferys No. 1 Gaddis Farms, Inc., NW cor. SE Sec. 26-7n-4w. S.D. 3,-448 ft.

Cleve Love et al No. 1 S. F. Johnson, NE cor. Sec. 29-6n-1w. S.D. 5,218 ft., sd.; arng. D.D.; will erect large steel drk.

Madison Parish

Union Prod. Co. No. 1 Anderson, Sec. 12-8n-1w. Drlg. 359 ft.; set 13⅜-in. csg. 300 ft.; drlg. sh.&sd. 1,320 ft.; no report.

Simpson County

Cleve Love No. 1 N. E. Garner, SW cor. SW NE Sec. 1-10n-17w. S.D. 720 ft.; to resume drlg.

Goodwill O. & G. Co. No. 1 Berry, Sec. 33-2n-4e. S.D. 2,810 ft.

Yalobusha County

Chas. W. Crader et al No. 1 John Bruce James, Sec. 24-11s-6w. S.D. 2,950 ft.

LOUISIANA

N. LOUISIANA WILDCATS

Bienville Parish

Ark. La. Gas Co. No. 2 Gayoso, 660 ft. SW cor. SE Sec. 14-16-10. T. Tr. Pk. 5,432 ft.; D.S.T. 5,796-5,805 ft. tstd. dry in 26 min.; set 8⅝-in. csg. 6,300 ft.; drlg. hd. gr. sd. 7,006 ft.

Bossier Parish

Triangle Drlg. Co. No. 1 Sandridge, C SE SW Sec. 14-17-12. Semiporous L. 3,203-12 ft.; set 7-in. csg. 3,200 ft.; used 500 gal. acd.; tstd. S.O.; drlg. L. 3,825 ft.

Caddo Parish

J. P. Adams et al No. 1 Stallcup, N ½ NW NW Sec. 34-22-16. 5½-in. csg. 2,-460 ft.; T.D. 2,468 ft.; O.I.H.; C.I.; W. O. tanks.

R. E. Allison No. 6 Ellerbe, SE cor. Sec. 27-18-14. Drlg. 1,567 ft.

R. E. Allison No. 7 Ellerbe, SW cor. Sec. 26-18-14. Set 13⅜-in. csg. 297 ft.; W. O.C.

R. E. Allison No. 1 Harman, SW cor. Sec. 34-18-14. Drlg. sh.&L. 4,217 ft.

R. E. Allison No. 1 La. Real Estate Dev. Co., Sec. 4-17-14. Drlg. sh.&L. 4,455 ft.

Ark. La. Gas Co. No. 1 Leonard fee, NW cor. SW SW Sec. 25-21-16. Cg. sdy. sh. 2,288 ft.

Mose Browning and E. D. Holcomb, Jr., No. 1 Henderson, SW cor. Sec. 27-22-16. Oil sd. 2,495-2,504 ft.; 7-in. csg. 2,-489 ft.; set 2 jts. 5½-in. perf. lnr. and 2-in. tbg. with pkr. at 2,487 ft.; set 158 ft. 5½-in. csg. on bttm.; T.D. 2,504 ft. perf. 2,494-2,500 ft.; W.O.S.R.

J. M. Buckler No. 2 Stiles, NE cor. Sec. 17-21-16. 6-in. csg. 1,048 ft.; T.D. 1,-051 ft.; tstd. S.W.; W.O.

F. W. Burford No. 3 Brown, NE cor. Sec. 5-23-15. T. Gloyd 6,058 ft.; por. L. 6,085-98 ft.; set 5½-in. csg. 6,033 ft.; W.O.C.; T.D. 6,125 ft.

Carney et al No. 3 Hart, SE NW Sec. 21-21-16. Set 8-in. csg. 1,563 ft.; tstd. S.O.; acdzd. with 3,000 gal.; tstd. dry; drld. to 1,930 ft.; tstd. S.W.; P.B. 1,807 ft.; W.O.C.

Paul Cooper et al No. 2 Stiles, NE cor. SW Sec. 28-21-16. Set 4-in. csg. 2,358 ft.; tstg. 2,384 ft.

H. C. Cummings No. 1 Burton, NW cor. NE Sec. 36-21-16. Drlg. sh. 1,820 ft.

J. P. Driscoll et al No. 1 Woolworth, SE cor. Sec. 26-20-15. Set 9⅝-in. csg. 1,-370 ft.; T.D. 1,400 ft.; W.O.

Leon Dunn No. 1 Nelson, NE cor. Sec. 26-18-14. 9⅝-in. csg. 1,500 ft.; drlg. 5,-043 ft.

W. C. Feazel No. 1 Hunter, SW cor. Sec. 23-18-14. Set 9⅝-in. csg. 1,484 ft.; drlg. 4,992 ft.

M. M. Ferrell No. 1 Satterwhite, SE NW Sec. 10-20-16. Prep. set csg. 1,349 ft.

Harry Fotiades No. 1 Tomlinson, C NE NW Sec. 35-18-14. Set 10¾-in. csg. 1,-500 ft.; 5½-in. csg. 5,575 ft.; comp.; 27 B.P.H.; 28/64-in. ck.; T.P. 450 lbs.; C.P. 1,000 lbs.; sat. L. (cor.) 5,564-85 ft.; cor. T.D. 5,585 ft.

Gerhig Co. No. 1 Land, NW SE Sec. 36-21-16. 5½-in. csg. 2,266 ft.; T.D. 2,278 ft.; flwg. and swbg. 100 B.P.D.; 2,278 ft.

H. H. Groneman No. 1 Browning, SW cor. Sec. 22-22-16. Drlg. sh. 1,800 ft.

H. C. Prod. Co. No. 1 Kinnebrew & Ratcliff, NE cor. Sec. 5-19-16. D.S.T. 2,-253 ft.; S.W.; 7-in. csg. 1,497 ft.; P.B. 1,680 ft.; O.T.D. 2,253 ft.; acdzd. with 2,000 gal.; O.&S.W. in hole; tstg. 1,680 ft.

Harry Hanbury No. 1 Slack et al NW cor. Sec. 26-18-14. Cg. 5,543 ft.

Hill, Neighbors and Rowe No. 1 Thigpen, NW SE Sec. 36-21-16. Drlg. sdy. sh. 1,750 ft.

Hurricane Pet. Corp. No. 1 Harman, 660 ft. N and W, C Sec. 34-18-14. Drlg. 3,-757 ft.

Wm. C. Leisk No. 1 Sinclair, NW SE Sec. 26-18-14. 13⅜-in. csg. 294 ft.; sat. L. 5,552-58 ft. and 5,560-63 ft.; set 5½-in. csg. 5,554 ft.; T.D. 5,567 ft.; flwd. 33 B.F.P.H., 35% S.W.; ¾-in. ck.; T.P. 500 lbs.; C.P. 100 lbs.; flwd. 28 B.O. and 15 bbls. S.W. per hr.; will P.B. 5,-567 ft.; S.I.

Ben Levy No. 1 Crystal fee, SW cor. Sec. 25-21-16. Set 4-in. csg. 2,250 ft.; W.O.S.R.

Lisbon-Iberia Oil Co. No. 1 Wallace, SW cor. SE Sec. 26-18-14. Set 13⅜-in. csg. 300 ft.; W.O.C.

C. C. Lowery No. 1 Collins, NW NE Sec. 7-20-15. R.U.

Lyons et al No. 1 McFaddin, NW cor. Sec. 3-17-14. Drlg. 1,490 ft.

W. R. Nicholson Oil Co. No. 1 DeSoto Corp., NW cor. Sec. 26-18-14. Drlg. L. 3,819 ft.

Oblinger & Ritter No. 1 Boisseau, SE cor. Sec. 34-21-16. Set 5-in. csg. 965 ft.; W.O.S.R. 976 ft.

S. H. Riggs and C. C. Gilger No. 1 W. D. Browning, NW cor. NE SW Sec. 27-22-16. R.U. and S.D.

Harry Shulman No. 1 Daniel, NW cor. SW Sec. 34-22-16. R.U.

Tippett Drlg. Co. No. 1 Stallcup, NW cor. Sec. 34-22-16. Flwg. 14 B.P.H.; ½-in. ck.; 5½-in. 2,471 ft.; T.D. 2,481 ft.

Tippett Drlg. Co. No. 1 Thigpen-Herold, NW cor. Sec. 34-22-16. D.&A.; sd. 2,-453-59 ft.; T.D. 2,500 ft.

R. W. Williams No. 1 Burton, SE cor. SW Sec. 36-21-16. Set 5½-in. csg. 2,-247 ft.; D.D. and tstg. 2,283 ft.

Wynne Drlg. Co. No. 1 Exchange Natl. Bnk., SE cor. Sec. 23-18-14. R.U.

Caldwell Parish

Critchett & Woods (formerly E. T. Oakes) No. 1 Kyles, NE cor. SW NE Sec. 18-11-3e. S.D. 1,503 ft.; rig rep.

Claiborne Parish

E. T. Oakes et al No. 2 Kilgore, C NW SE Sec. 28-21-5. Hd. to slightly por. L. 5,294-5,303 ft.; 5½-in. csg. 5,287 ft.; acdzd. with 5,000 gal.; swbg.; 2,000 ft. O.I.H. 5,324 ft.; W.O.S.R.

De Soto Parish

S. S. Alexander No. 1-A Stoll, Sec. 5-12-16. Set 7-in. csg. 2,705 ft.; acd. with 3,000 gal. and tstd. est. 2,000,000 cu.ft. gas; 400 lbs.; D.S.T. 2,984-3,046 ft.; tstg 165 ft. mud cut with oil, 35 min.; set short string 5-in. csg. on bttm.; T.D. 3,145 ft.; perf. 3,000-44 ft.; 2,500 ft.; flwd. 3 days, est. 10 B.P.D. and went dead; reperf. csg. 2,995-3,045 ft. and tstg. 3,064 ft.; O.T.D. 3,145 ft.; treated with 500 gal. acd.; W.O.; hole full of oil.

T. D. Humphries No. 1 Jenkins Est., C NE SW Sec. 12-12-14. Set 10¾-in. csg. 295 ft.; W.O.C.

A. L. Sutton No. 1 Frost Lbr. Co., C NE SE Sec. 35-11-15. Set 13⅜-in. csg. 400 ft.

La Salle Parish

Stovall Drlg. Co. No. 4-B Russell, NW cor. Sec. 25-10-1e. S.D. 1,550 ft.

LEGAL

Sale of oil and gas leases—Department of the Interior, General Land Office, Washington, D. C. Notice is given that the following described lands and deposits of oil and gas therein contained are offered to the qualified bidder of the highest bonus per acre for leasing, pursuant to section 17 of the leasing act of February 25, 1920 (41 Stat. 437), as amended by the act of August 21, 1935 (49 Stat. 674), at the royalty rate scale in the lease form shown in Circular 1386: Unit No. 1, the principal island, East Timbalier Island, known locally as Bird Island, located in fractional Secs. 34, 35 and 36, T. 23 S., R. 21 E., Secs. 2 and 3, T. 24 S., R. 21 E., and Sec. 31, T. 23 S., R. 22 E., Louisiana Meridian, situated on the Gulf Coast of La Fourche Parish, State of Louisiana, lying above the elevation of mean high tide, containing 295.77 acres, more or less. Unit No. 2, two islands, adjoining Unit No. 1 in a northeasterly direction between said principal island and Raccoon Pass, Island No. 1 located in fractional Sec. 31, and Island No. 2 located in fractional Sec. 32, both in T. 23 S., R. 22 E., Louisiana Meridian, situated on the Gulf Coast of La Fourche Parish, State of Louisiana, lying above the elevation of mean high tide, containing 11.69 and 69.29 acres, respectively, more or less. Sealed bids will be received in the office of the Secretary of the Interior up to 12:00 o'clock (noon), April 3, 1939. Bids must be submitted on each unit separately but both units, if awarded to the same bidder, may be included in a single lease. Each bidder must submit a certified or cashier's check or draft for 1/5 of the amount bid, payable to the order of the Secretary of the Interior, and furnish a showing of qualifications as required by section 7 of Circular 1386. The remaining 4/5, together with the annual rental at the rate of $1 per acre, must be paid by the successful bidder prior to the issuance of lease, and the deposits of other bidders will be returned. The envelopes should be marked plainly "Bid for Unit No..... (1 or 2), East Timbalier Area. Not to be opened before noon, April 3, 1939." The bidders are warned against violations of the provisions of Sec. 59 of the United States Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. Protests by the State of Louisiana and others claiming under the State against the granting of Government leases for the group of islands on the ground that they are the property of the State were overruled by the Secretary of the Interior in a decision rendered July 29, 1938 (A.21589), after an oral hearing at which the protestants were represented. The Secretary held that the United States has asserted ownership of and jurisdiction over East Timbalier Island for more than 100 years and that the group of islands are public lands of the United States. In the interest of securing full and unrestrained bidding, assurance is given to all bidders that the United States will defend its title to the Islands on its own behalf in any litigation instituted in which, in its judgment, any issue of title to the Islands is probably and approximately raised. In the event litigation is instituted in which title to the Islands is involved and the claim of title of any adverse party is ultimately sustained, the full amount of bonus paid by the successful bidder will be returned to him. Commissioner, General Land Office.

G. C. Walsenham No. 3 Dean, NE cor. SE Sec. 23-9-1e. Set 6⅝-in. csg. 1,638 ft.; T.D. 1,640 ft.; W.O.C.

Natchitoches Parish

Jack Lent et al No. 1 Whatley, SW cor. Sec. 17-10-10. S.O.&G. reported at 1,490-1,516 ft.; D.S.T. 3,282-96 ft.; tstd. 100 ft. mud cut with 40-grv. oil; P.B. 3,300 ft.; set 6⅝-in. csg. 3,282 ft.; bld. down 600 ft. of bttm.; S.S.O.; ran 2-in. tbg. and lnr. and tstd. S.O.&S.W.; W. O.; T.D. 3,300 ft.

Red River Parish

H. B. Schumacher No. 1 Crichton, SW cor. NW Sec. 18-13-10. Set 8-in. csg. 1,065 ft.; tstd. S.S.O.; S.D. 1,450 ft.

Sabine Parish

Cantwell & Quick No. 1 Sabine, NE cor. SE NE Sec. 8-7-13. Set 10-in. csg. 61 ft.

Geo. Ellis No. 1 Walker, 500 ft. NW cor. NW SE Sec. 8-4-12. Set 12½-in. csg. 276 ft.; reported S.O. 2,180 ft. and 2,263-65 ft.; rng. csg. 2,269 ft.; cd. sdy. sh. 2,265-69 ft.; set 7-in. csg. 2,250 ft.; W.O.C. 2,271 ft.

A. B. House No. 1 Sabine, NW NW Sec. 23-7-14. 8-in. csg. 2,134 ft.; used 7,000 gal. acd.; tstd. dry; cond. mud 3,642 ft.; arng. set 7-in. 3,500 ft.; T.D. 3,642 ft.

D. N. Jolley No. 1 Summers, C SW NE Sec. 14-7-13. Set 10-in. csg. 100 ft.; set 7-in. csg. 2,188 ft.; T.D. 2,632 ft.; used 3,000 gal. acd.; tstd. S.O. 2,615 ft.; S.W. and abd. 2,632 ft.

Major Oil Co. No. 2-C Bowman Hicks, C NW NE Sec. 4-7-12. Set 7-in. csg. 2,492 ft.; used 2,500 gal. acd. and tstg. 2,700 ft.

Major Oil Co. No. 3-C Bowman-Hicks, C SE SW Sec. 34-8-12. R.U.

H. M. Sneed No. 1 Leone, SW cor. NW SE Sec. 8-7-13. Set 10-in. csg. 60 ft.; W.O.C.

Sutton Zwolle Oil Co. No. 2 Bowman Hicks, NW cor. SW NW Sec. 6-7-13. T. chk. rk. 2,069 ft.; set 6-in. csg. 2,070 ft.; tstd. S.S.W.; D.&A. 2,524 ft.

Voline Oil Co. No. 1 Sabine, NE cor. NW NW Sec. 23-7-14. Reported S.O. in sdy. L. 3,760-3,805 ft.; set 6⅝-in. csg. 3,760 ft.; T.D. 3,805 ft.; tstd. dry 3,805 ft.; S.W. broke in; believe csg. seat gave way; tstd. formation 3,805-3,976 ft.; dry; recmtd. 6⅝-in. csg. 3,760 ft.; W.O.C.; T.D. 3,976 ft.; tstd. S.W. 3,760 ft.; P.B. 2,250 ft.; tstd. dry 2,123 ft.; abd.; O. T.D. 3,976 ft.

Williams & Spiers No. 1 Byrd, SW cor. SE NW Sec. 1-7-11. Drlg. sh. 2,300 ft.

Tensas Parish

H. V. Schumacher No. 4 Mound Plantation, Sec. 29-11-12e. S.D. 3,002 ft.

Union Parish

Standard Oil Co. of La. and Joe Modisett No. 1-B Frost Lbr. Ind., Sec. 14-23n-2w. Drlg. 3,853 ft.

Webster Parish

Hassie Hunt No. 11 Davis, C SE SW Sec. 13-21-10. Drlg. sh. 5,615 ft.

Hassie Hunt No. 1 Hodges, C SE SE Sec. 11-21-10. Drlg. sh. 4,000 ft.

Hunt Oil Co. No. 4 Bodcaw-Stewart, 2,155 ft. N and 660 ft. E. SW cor. Sec. 34-21-10. Holly. sd. 5,821-47 ft.; set 9⅝-in. csg. 5,802 ft.; tstd. S.O.&G. in Holly. sd.; T. "D" sd. 8,245-63 ft.; Bdcw. sd. 8,340-81 ft. (dist.); set 7-in. csg. 8,429 ft.; T.D. 8,431 ft.; recmtd.; bad csg. job; W.O.

Hunt Oil Co. No. 5 Bodcaw-Stewart, NW cor. NE Sec. 33-21-10. Hollwy. sd. 5,734-63 ft. and 5,885-95 ft., oil; set 9⅝-in. csg. 5,938 ft.; drlg. sdy. sh. 7,932 ft.

Hunt Oil Co. No. 1 Miller, 100 ft. N, C NW NE Sec. 4-20-10. R.U.

Hunt Oil Co. No. 6 Webb, C NE SE Sec. 14-21-10. Set 13⅜-in. csg. 628 ft.; Holloway sd. 5,690-5,700 ft. and 5,814-24 ft. (oil); set 9⅝-in. csg. 5,655 ft.; comp. 88 P.B.H.; ¾-in. ck.; T.P. 700 lbs.; C. P. 1,200 lbs.; T.D. 5,943 ft.

Magnolia Pet. Co. No. 1 Cox, C NW SW Sec. 15-21-10. Set 13⅜-in. csg. 847 ft.; 9⅝-in. csg. 5,868 ft.; drlg. sdy. L. 8,027 ft.

Magnolia Pet. Co. and Ohio Oil Co. No. 1 Coyle-Hodges Unit, SW cor. NW Sec. 21-21-10. Set 9⅝-in. csg. 5,927 ft.; drlg. sdy. sh. 7,723 ft.

Magnolia Pet. Co. No. 1 Roseberry Unit, 20 ft. N and W, C SE Sec. 29-23-9. Set 13⅜-in. csg. 887 ft.; T. Pettit L. 5,725 ft.; S.O. 5,764-66 ft.; T. Tr. Pk. 5,900 ft.; set 9⅝-in. csg. 5,962 ft.; T. lwr. Marine 7,850 ft.; T. Bdcw. sd. 8,289 ft., S.W.; T. Davis sd. 8,548 ft.; broken gas and dist. sd. 9,145-82 ft.; T.D. 9,380 ft.; set 5½-in. csg.; W.O.C.

Midstates Oil Corp. No. 1 Giddens, 100 ft. NW cor. SW SW Sec. 30-21-9. Set 13-in. csg. 100 ft.; set 9⅝-in. csg. 5,794 ft.; W.O.C. 6,115 ft.

Oliphant Oil Co. No. 2-A Stewart et al, SW cor. Sec. 33-21-10. R.U.

Union Prod. Co. No. 1 Walker Unit, 50 ft. S, C SE Sec. 30-18-8. Set 9⅝-in. csg. 6,490 ft.; T. Pettit 6,665 ft.; T. Tr. Pk. 6,910 ft.; drlg. hd. sdy. sh. 8,552 ft.

SOUTH LOUISIANA FIELDS

Abbeville—Vermilion Parish

Continental Oil Co. No. 1 Franciol. Sec. 67-12s-3e. Drk.

Continental Oil Co. No. 1 Lucion Duhon, Sec. 17-12s-3e. Drlg. sd.&gvl. 280 ft.

Bancroft—Beauregard Parish

Republic Prod. Co. No. 6 Columbia Ld. & Tbr. Co., Sec. 15-6s-13w. Drlg. 7,725 ft.

Republic Prod. Co. No. 4 Lutcher Moore Lbr. Co., Sec. 16-6s-13w. Drk.

Republic Prod. Co. No. 2 Whitman, Sec 15-6s-13w. T.D. 7,322 ft.; 7-in. csg. 7,320 ft.

Bateman Lake—St. Mary Parish

Texas Co. No. 2 State-Bateman Lake, Sec. 21-16s-12e. 13⅜-in. csg. 1,700 ft.; drlg. sh. 7,332 ft.

Texas Co. No. 2 Wax Bayou Co., Sec. 21-16s-12e. Drlg. sh. 7,435 ft.

Baton Rouge—East Baton Rouge Parish

Guaranty Oil Co. No. 1 D. J. Morgan. R.U.

Geo. Helis et al No. 1 McInnis, Sec. 36-8s-1w. Loc.

Wm. Helis No. 4 Harry B. Nelson, Sec. 36-7s-1w. R.U.

Bay St. Elaine—Terrebonne Parish

Texas Co. No. 2 L.L.&E., Bay St. Elaine, Sec. 18-22s-18e. T.D. 6,500 ft.; 9⅝-in. csg. 6,020 ft.; csg. collapsed; sdtrkd.; drlg. sh. 6,700 ft.

Bayou Blue—Iberville Parish

Humble O. & R. Co. No. 11 Wilberts, Sec. 67-9s-11e. Loc.

Bayou Choctaw—West Baton Rouge

La. Crusader No. 5 Schwing, Sec. 29-8s-11e. 9⅝-in. csg. 2,250 ft.; T.D. 4,755 ft.; P.B. 4,200 ft.; sdtrkd. 4,214 ft.; T.D. 7,878 ft.; P.B. 7,530 ft.; stk. D.S.; P.B. 5,800 ft.; sdtrkd.; T.D. 5,890 ft.; P.B. 5,200 ft.; T.D. 8,648 ft.; stk. D.S.; cutting and pulling.

La. Crusader No. 6 Schwing, Sec. 29-8s-11e. T.D. 8,609 ft.; 7-in. csg. 8,609 ft.; per. csg. 8,220-40 ft.; I.P. 350 B.P.D.; ¾-in. ck.

Bayou des Allemands—St. Charles Parish

Amerada Pet. Corp. No. 3 St. Charles Ld. Co., Sec. 13-15s-20e. Cd. oil sd. 8,765-66 ft.; T. salt 9,451 ft.; T.D. 9,453 ft.; abd.

Amerada Pet. Corp. No. 4 St. Charles Ld. Co., Sec. 13-15s-2e. Loc.

Caillou Island—Terrebonne Parish

Texas Co. No. 29 State, Sec. 17-23s-20e. Rig.

Texas Co. No. 54 State, Sec. 20-23s-20e. T.D. 4,283 ft.; 7⅝-in. csg. 4,276 ft.; perf. csg. 3,962-4,072 ft.; I.P. 42 B.P.D.; ¼-in. ck.

Texas Co. No. 55 State, Sec. 20-23s-20e. Loc.

Cameron Meadows—Cameron

Burton-Sutton Oil Co. No. 26 Sch. Ld., Sec. 16-14s-13w. T.D. 2,465 ft.; 13⅜-in. csg. 2,465 ft.; T.D. 6,564 ft.; P.B. sdtrkd.; drlg. sh. 7,365 ft.

Chacahoula—La Fourche Parish

Sun Oil Co. No. 5 Dibert, Stark & Brown Cypress Co., Sec. 70-15s-15e. 16-in. csg. 110 ft.; 10¾-in. csg. 1,865 ft.; T.D. 6,055 ft.; stk. D.S.; P.B. and sdtrkd. at 3,718 ft.; drld. to T.D. 4,312 ft.; P.B. 1,850 ft.; sdtrkd.; drlg. sh. 5,439 ft.

Sun Oil Co. No. 4 Delbert Stark and Brown Cypress Co., Sec. 70-15s-15e. T.D. 7,794 ft.; P.B. 6,764 ft.; sdtrkd.; T.D. 8,268 ft.; stk. D.S.; shot at 8,195 ft.; P.B. 7,642 ft.

Chalkley Field—Cameron Parish

Humble O. & R. Co. No. 2 Cameron Par Sch. Ld., Sec. 16-12s-6w. T.D. 8,900 ft.; P.B. 8,860 ft.; perf. csg. 8,846-50 ft.

Humble O. & R. Co. No. 2 Sweet Lake Ld. & Oil Co., Sec. 8-12s-6w. Loc.

Shell Pet. Corp. No. 1-A Katherine Bel Hanzen, Sec. 15-12s-6w. Loc.

Charenton—St. Mary Parish

Commerce Oil Co. No. 1 T. Brulation, Sec. 19-13s-10e. Loc.

Edmont Oil Co. No. 2 Blanchard, Sec. 21-13s-9e. T.D. 1,148 ft.; 5½-in. csg. 1,141 ft.; tstd. S.W.; P.B. 1,132 ft.; perf. csg. 1,125-32 ft.; W.O.S.R.

Kinsley Oil, Inc., No. 1-B Hertel, Sec. 30-13s-9e. Loc.

Pan American Prod. Co. No. 1 Achee, Sec. 21-13s-9e. Loc.

Pan American Prod. Co. No. 12 Laws Realty Co., Sec. 36-13s-9e. 8⅝-in. csg. 985 ft.; drlg. sh. 7,210 ft.

Pan American Prod. Co. No. 12 Veeder, Sec. 11-13s-9e. Drlg. sh. 2,070 ft.

J. P. Scranton No. 1 State Bayou, Sec. 30-13s-10e. 5½-in. csg. 7,878 ft.

Chenevyille—Rapides Parish

Sid Richardson No. 1 Well Co., Inc., Sec. 55-1s-2e. Drlg. sh. 2,125 ft.

Texas Canadian Oil Co. No. 1 Myrtle B. Pope, Sec. 4-1s-2e. R.U.

Convent—St. James Parish

Continental Oil Co. No. 2 Realty Operators, Inc., Sec. 16, 13¾-in. csg. 1,492 ft.; T.D. 7,889 ft.; P.B. 7,275 ft.; sdtrkd. 7,305 ft.; T.D. 8,235 ft.; well blew out; caught fire; fsg.

Creole—Cameron Parish

Superior Oil Co. No. 5 State-Gulf of Mexico, Sec. 4-15s-8w. T.D. 4,253 ft.; P.B.; sdtrkd.; T.D. 7,192 ft.; 5½-in. csg. 6,951 ft.; perf. csg. 6,847-54 ft.; comp. as gas well.

Superior Oil Co. No. 6 State-Gulf of Mexico. Drlg. sh. 1,210 ft.

Darrow—Ascension Parish

Humble O. & R. Co. No. 15 Gumbel, Sec. 33-10s-2e. T.D. 7,075 ft.; sh.

Kiva Oil Co. No. 1 Duplessis, Sec. 69-10s-2w. S.D. 2,523 ft.

Dog Lake—Terrebonne Parish

Texas Co. No. 9 State, Sec. 5-22s-16e. Drlg. sh. 2,719 ft.

Eola—Avoyelles Parish

Humble O. & R. Co. No. 21 Community, Sec. 31-10s-2e. Loc.

J. E. Jones No. 1 Haas Inv. Co., Sec. 8-2s-3e. Drlg. sh. 2,720 ft.

O'Meara Bros. No. 1 W. F. Kelley, Sec. 7-2s-3e. 13⅜-in. csg. 15 ft.; W.O. permit.

Pomo Prod. Co. No. 1 S. W. Sentel, Sec. 5-2s-3e. T.D. 7,750 ft.; fsg.

Sid Richardson No. 2 Haas Inv. Co., Sec. 7-2s-3e. T.D. 1,428 ft.; 10¾-in. csg. 1,428 ft.; drlg. sh. 7,120 ft.; top Cock. 6,506 ft.; oil sd. 6,506-11 ft.; S.W. sd. 6,511-21 ft.; T. Sparta 7,345 ft.; sd.; oil odor; cd. 7,475-81 ft.; cg. sh. 8,632 ft.; cd. Wlx. 8,448-8,561 ft.; T.D. 8,640 ft.; perf. csg. 8,460-8,555 ft.; comp.; no ga.

Sid Richardson No. 3 Haas Inv. Co., Sec. 7-2s-3e. No report.

Sid Richardson No. 1 State Bayou, Sec. 7-7s-2e. Driving piling.

Sun Oil Co. No. 1 E. A. Townsend, Sec. 8-2s-2e. Loc.

Fausse Point—Iberia Parish

Texas Co. No. 5 State Lake-Fausse Point, Sec. 35-11s-8e. Drlg. sh. 11,825 ft.

Gibson—Terrebonne Parish

Shell Pet. Corp. No. 3 R.E.K., Sec. 40-17s-15e. Dredge canal.

Gillis—Calcasieu Parish

Union Sulphur Co. No. 8 Kaufman, Sec. 7-9s-8w. Drlg. sh. 6,312 ft.

Golden Meadows—La Fourche Parish

Martex Pet. Corp. No. 1 Falgout Holding Co., Inc., Sec. 9-19s-22e. Cd. sh.& sd.; O.S. 2,636-45 ft. and oil sd. 2,645-54 ft.; cg. sd. 6,500 ft.

Grand Bay—Plaquemines Parish

Gulf Oil Corp. No. 4 Grand Prairie Lve. Dist., Sec. 48-20s-18e. Loc.

Gulf Oil Corp. No. 2 State, Sec. 6-20s-19e. Drlg. sh. 1,725 ft.

Hackberry—Cameron Parish

F. W. Bennett No. 1 Bickford, Sec. 37-12s-10w. 7-in. csg. 7,037 ft.; cg. sdy. sh. 7,325 ft.

Gulf Oil Corp. No. 25-A Erwin, Sec. 13-12s-10w. Drk.

O'Meara Bros. No. 1 Mary E. Jones, Sec. 38-12s-10w. T.D. 1,800 ft.; abd.

Superior Oil Co. No. 2-C Kaough, Sec. 30-12s-10w. Drlg. sh.&sd. 7,330 ft.

Texas Co. No. 25-B State, Twp. 12s-9w. Drlg. sh. 5,269 ft.

Union Sulphur Co. No. 12 Doiron, Sec. 37-12s-10w. Drlg. sh. 7,025 ft.

Union Sulphur Co. No. 13 Doiron, Sec. 37-12s-10w. Drlg. sh. 5,495 ft.

Union Sulphur Co. No. 1 Josephine O'Quinn, Sec. 37-12s-10w. Drlg. sh. 6,110 ft.

Union Sulphur Co. No. 45 Watkins, Sec. 13-12s-10w. T.D. 3,203 ft.; P.B. 1,400 ft.; sdtrkd. 1,483 ft.; T.D. 3,211 ft.; 5-in. csg. 3,203 ft.; perf. csg. 3,070-80 ft.; tstg.

Horseshoe Bayou—St. Mary Parish

Texas Co. No. 2 State, Sec. 37-17s-9e. 9⅝-in. csg. 11,631 ft.; T.D. 12,770 ft.; set 1,659 ft. of 6⅝-in. csg. at 12,645 ft.; set 70 ft. of 6⅝-in. csg. 8,473 ft.; prep. to perf. csg. 11,782-11,847 ft.; hung slotted pipe; S.D.

Jefferson Island—Iberia Parish

Texas Co. No. 2 Jefferson Island, Sec. 58-12-5e. 18⅝-in. csg. 40 ft.; 7⅝-in. csg. 8,451 ft.; drlg. sh. 8,480 ft.

Texas Co. No. 2 State-Lake Peigneur, Twp. 12s-5w. Drlg. sh. 4,212 ft.

Jennings—Acadia Parish

W. T. Burton No. 6 Roboria, Sec. 41-9s-2w. 7-in. csg. 6,721 ft.; fsg. tbg.; T.D. 6,997 ft.; sdtrkd. at 6,118 ft.; drld. to 6,178 ft.; sdtrkd. at 6,023 ft.; T.D. 6,732 ft.; trying to drill by fish; P.B. 6,104 ft.; W.O.C.; sdtrkd. 6,020 ft.; T.D. 6,056 ft.; 7-in. csg. 2,203 ft. and 10¾-in. csg. 2,108 ft.; sdtrkd.; drld. into old hole; P.B.; sdtrkd. 2,302 ft.; T.D. 6,763 ft.; 7-in. csg. 6,711 ft.; perf. csg. 6,292-6,430 ft.; flwd. some oil, then went dead; prep. to W.O.

Glassell & Glassell No. 5 McFarlain, Sec. 41-9s-2w. T.D. 7,268 ft.; 6-in. csg. 7,268 ft.; perf. csg. 6,980-7,195 ft.; I.P. 495 B.P.D.; 14/64-in. ck.

Glassell & Glassell No. 7 McFarlain, Sec. 41-9s-2w. R.U.

Gulf Oil Corp. No. 41 Arnaudet, Sec. 47-9s-2w. Drlg. sh. 4,162 ft.

Shell Pet. Corp. No. 6 Conover, Sec. 40-17s-15e. Drlg. sd. 1,267 ft.

Stanolind O. & G. Co. No. 114 Crowley Oil & Mineral Co., Sec. 48-9s-2w. R.U.

Lafitte—Jefferson Parish

Texas Co. No. 2 Sch. Bd., Sec. 20-17s-24e. Drlg. 760 ft.

Texas Co. No. 2 State-Bayou Norman, Sec. 21-17s-24e. Dredge canal.

Lake Barre—Terrebonne Parish

Texas Co. No. 43 State, Sec. 30-21s-20e. Drk.

Lake Mongoulois—St. Martin Parish

Texas Co. No. 7 State, Sec. 10-10s-9e. Driving piling.

Lake Pelto—Terrebonne Parish

Texas Co. No. 23 State, Twp. 23s-18e. T. salt 6,055 ft.; T.D. 6,225 ft., salt; P.B. 4,750 ft.; sdtrkd.; drlg. sh. 4,911 ft.

Lirette—Terrebonne Parish

Humble O. & R. Co. No. 2 H. J. Ellender, Sec. 32-19s-19e. Cd. sd. S.G. 10,465-74 ft.; 9⅝-in. csg. 8,614 ft.; drlg. sh. 11,595 ft.

Lockport—Cameron Parish

Continental Oil Co. No. 2 J. H. Moss, Sec. 8-10s-9w. Drlg. sh. 5,755 ft.

New Iberia—Iberia Parish

Wm. Helis No. 7 Bolivar, Sec. 56-12s-7e. Drlg. sh. 3,254 ft.

Wm. Helis No. 8 Bullock, Sec. 25-12s-7e. Drlg. sd.&sh. 5,511 ft.; no report.

Lisbon-Iberia Oil Corp. No. 7 Gulf fee, Sec. 25-12s-7e. T.D. 4,155 ft.; rmg.

Texas Co. No. 2 Bryant, Sec. 25-12s-7e. R.U.

Texas Co. No. 6 Bryant, Sec. 25-12s-7e. Drlg. sh. 1,275 ft.

Texas Co. No. 1 DeCuir, Sec. 25-12s-7e. Drlg. sh. 5,520 ft.

Texas Co. No. 2 Gonsoulin, Sec. 13-12s-7e. Cg. sh. 9,285 ft.

Texas Co. No. 2-A Hanzon, Sec. 54-12s-7e. 7⅝-in. csg. 8,075 ft.; drlg. sh. 8,212 ft.

Texas Co. No. 1 Renaudet et al, Sec. 71-12s-7e. 9⅝-in. csg. 8,338 ft.; drlg. sh. 8,977 ft.

North Crowley—Acadia Parish

Humble O. & R. Co. No. 4 Ohlenforst, Sec. 45-8s-1e. Drlg. sh. 1,327 ft.

North Tepetate—Acadia Parish

Atlantic Ref. Co. No. 1 Aden & Doga, Sec. 11-7s-2w. 16-in. csg. 319 ft.; drlg. sh. 7,635 ft.

Atlantic Ref. Co. No. 4 Klumpp, Sec. 12-7s-2w. T.D. 8,556 ft.; 7-in. csg. 8,556 ft.; flwd. 52½ bbls. dist.; prep. to W.O.

Port Barre—St. Landry Parish

Pan American Prod. Co. No. 4 H. L. Garland, Sec. 4-6s-5e. Drk.

Y. D. Spill No. 1 Gaudet, Sec. 4-6s-5e. S.D. 4,700 ft.

Western Gulf Prod. Co. No. 1 Watkins, Sec. 4-6s-5e. Loc.

Potash—Plaquemines Parish

Humble O. & R. Co. No. 38 Orleans Lve. Dist., Sec. 13-18s-15e. 13⅜-in. csg. 2,957 ft.; drlg. sd. 4,545 ft.

Quarantine Bay—Plaquemines Parish

Gulf Oil Corp. No. 1-A Plaquemines Ld. Co., Sec. 18-19s-17e. Drlg. sh. 8,186 ft.

Gulf Ref. Co. No. 5 State, Sec. 17-19s-17e. Loc.

Gulf Oil Corp. No. 8 State, Sec. 18-19s-17e. Drlg. sh.&L. 7,870 ft.

Gulf Oil Corp. No. 9 State QQ, Sec. 18-19s-17e. Loc.

Raceland—La Fourche Parish

Amerada Pet. Corp. No. 1 Godchaux Sugars, Inc., Sec 34-15s-19e 18⅝-in. csg. 262 ft.; T.D. 11,312 ft.; 7-in. csg. 11,312 ft.; T.A.

South Roanoke—Jeff Davis Parish

Continental Oil Co. No. 2 Sturdivant, Sec. 36-10s-4w. T.D. 9,825 ft.; 8⅝-in. csg. 9,825 ft.

Timbalier Bay—La Fourche Parish

Gulf Oil Corp. No. 4 State. T.D. 7,268 ft.; sdtrkd.; 5-in. csg. 5,320 ft.; T.D. 5,340 ft.; failed to flow; S.D.

Valentine—La Fourche Parish

Pan American Prod. Co. No. 19 Harang, Sec. 8-17s-20e. Drlg. sdy. sh. 4,700 ft.

John Vacarro et al No. 2 Acosta Hrs., Sec. 9-17s-20e. Drlg. sdy. sh. 5,375 ft.

Villa Platte—Evangeline Parish

Continental Oil Co. No. 1 Crise Deville, Sec. 26-3s-2e. T.D. 8,940 ft.; comp.; no ga.

Continental Oil Co. No. 3 Haas, Sec. 44-3s-2e. M.I.M.

Continental Oil Co. No. 3 Opelousas-St. Landry Securities Co., Sec. 44-3s-2e. Drlg. sh. 7,931 ft.

Continental Oil Co. No. 4 Irene McDaniel, Sec. 45-3s-2e. Drk.

Continental Oil Co. No. 1 Rene McDaniel, Sec. 45-3s-2e. Drlg. sh. 8,222 ft.

Continental Oil Co. No. 1 Tate, Sec. 45-3s-2e. T.D. 9,242 ft.; oil sd. 8,891-8,904 ft.

Continental Oil Co. No. 3 Ed Tate, Sec. 45-3s-2e. Drk.

Continental Oil Co. No. 3 Vidrine, Deville, Sec. 46-3s-2e. T.D. 9,053 ft.; perf. csg. 8,867-87 ft.; I.P. 390 B.P.D.; ¼-in. ck.

Texas Co. No. 3 Marman fee, Sec. 45-3s-2e. R.U.R.

Venice—Plaquemines Parish

Tide Water Asso. Oil Co. No. 5 Buras Lv. Bd., Sec. 23-21s-30e. Loc.

Tide Water Asso. Oil Co. No. 4 Buras Levee Dist., Sec. 23-21s-20e. T. salt 3,120 ft.; sdtrkd.; drlg. sh. 5,290 ft.

Vinton—Calcasieu Parish

J. Rediek et al No. 4 Vincent Hrs., Sec. 66-10s-12w. Drlg. sh. 1,620 ft.

Woodlawn—Jeff Davis Parish

Union Sulphur Co. No. 4 Calcasieu Natl. Bnk., Sec. 12-9s-6w. T.D. 8,905 ft.; perf. csg. 8,867-73 ft.; tstg.

Union Sulphur Co. No. 1 Dovaran-O'Connor, Sec. 12-9s-6w. Drlg. sh. 7,710 ft.

Union Sulphur Co. No. 2 Miller, Sec. 7-9s-5w. Loc.

Union Sulphur Co. No. 3 Mrs. O'Miller, Sec. 7-9s-5w. Loc.

Union Sulphur Co. No. 2 Osmon, Sec. 7-9s-5w. T.D. 9,111 ft.; P.B. 5,910 ft.; sdtrkd.; drlg. sh. 7,990 ft.

S. LOUISIANA WILDCATS

Acadia Parish

T. T. Tolson et al No. 1 J. Turner, Sec. 25-7s-1e. M.I.M.
Tri Parish Drillers, Inc., No. 1 Paul Stag, Sec. 4-7s-1w. Drk.

Allen Parish

Bel Oil Corp. No. 1 J. A. Bel, Sec. 22-6s-3w. Drlg. sd.&sh. 5,529 ft.

Assumption Parish

Humble O. & R. Co. No. 1 Milliken & Farewell Co., Inc., Sec. 79-14s-14e. 13⅜-in. csg. 2,978 ft.; T.D. 11,920 ft.; abd.

Beauregard Parish

Atlantic Ref. Co. No. 1 Lutcher Moore, Sec. 22-3s-11w. Loc.
Atlantic Ref. Co. No. 1 Rice Ld. & Lbr. Co., Sec. 22-3s-11w. Spd.
Atlantic Ref. Co. No. 1-A Rice Ld. & Lbr. Co., Sec. 22-3s-11w. Bldg. road.
Standard Oil Co. of Calif. No. 1 Long Bell Lbr. Co., Sec. 40-17s-15e. M.I.M.

Calcasieu Parish

David B. MacDaniel No. 2 Sch. Ld., Sec. 16-9s-7w. 15⅛-in. csg. 46 ft.; 10¾-in. csg. 1,299 ft.; T.D. 7,890 ft.; S.D.
Union Sulphur Co. No. 1 Ulrich, Sec. 19-9s-10w. R.U.

Cameron Parish

Superior Oil Co. No. 2 John Sells, Sec. 4-15s-8w. T.D. 7,000 ft.; P.B.; sdtrkd.; drlg. sh. 5,526 ft.
Union Sulphur Co. No. 1 Sweet Lake Ld. Co., Sec. 9-12s-7w. R.U.

Iberia Parish

Texas Co. No. 1 Petit Anse, Sec. 59-13s-6e. Drlg. sh. 9,912 ft.
Texas Co. No. 3-B State-Vermilion Bay, Twp. 16s-5e. Drlg. sh. 6,025 ft.
Superior Oil Co. et al No. 1 State, Grand Lake, Sec. 24-13s-4w. T.D. 103 ft.; driving piling.

Iberville Parish

California Co. No. 1 Schwing Lbr. Co., Sec. 96-10s-10e. 20-in. csg. 177 ft.; 9⅝-in. csg. T.D. 10,106 ft.; twisted off drill collar; P.B.; sdtrkd. 9,613 ft.; drlg. sh. 10,314 ft.
Humble O. & R. Co. No. 1 Iberville Mortgage Loan Co., Inc., Sec. 74-7s-10e. 20-in. csg. 208 ft.; drlg. sd. 6,248 ft.
Shell Pet. Corp. No. 1 Natalbany Lbr. Co., Sec. 18-9s-2e. Drlg. sh. 8,979 ft.

Jeff Davis Parish

Union Sulphur Co. No. 1 H. B. Tietje Sec. 36-7s-4w. Drlg. sh. 3,525 ft.

La Fourche Parish

Gulf Oil Corp. No. 1 Grandison Ld. Co., Sec. 14-20s-23e. Drlg. sh. 1,730 ft.
Texas Co. No. 1 L.L.&E. Golden Meadows, Sec. 77-19s-21e. 9⅝-in. csg. 10,744 ft.; drlg. sdy. sh. 10,966 ft.

Orleans Parish

W. T. Burton No. 1 L.&N.R.R., Sec. 18-11s-15e. Drlg. sh.&sd. 7,595 ft.
W. T. Burton No. 3 L.&N.R.R., Sec. 25-11s-14e. Loc.
W. T. Burton No. 1-B R. E. E. de Montluzin, Sec. 1-10s-13e. Drk.

Plaquemines Parish

Texas Co. No. 1 L.L.&E., Bastian Bay. Sec. 43-20s-28e. 9⅝-in. csg. 9,540 ft.; T.D. 10,029 ft.; fsg.

Pointe Coupee Parish

Falcon-Seaboard No. 1 J. H. Hobgood, Sec. 8-1s-7e. R.U.

Rapides Parish

Gulf States Explin. No. 1 Erwin & Bishop, Sec. 35-1n-3w. Drlg. sh. 6,455 ft.
Lyons & Neely No. 1 W. P. Aertker, Sec. 16-4n-1e. Drk.

St. Bernard Parish

Gulf Ref. Co. No. 4-State-R.R. (Lake Borgne), Twp. 12s-15e. 9⅝-in. csg. 8,161 ft.; T.D. 10,632 ft.; P.B. 9,700 ft.; rmd. to 9,658 ft.; lost core bbl.; P.B. 9,487 ft.
Vendome Pet. Corp. No. 1 Kenilworth Plantation, Sec. 59-13s-14e. 9⅝-in. csg. 10,809 ft.; cd. 10,880-10,900 ft., sdy. sh.; gas odor; cd. gas sd. 10,990-11,050 ft.; T.D. 11,469 ft.; 7-in. csg. 11,469 ft.; will perf. csg. 11,200-20 ft.

St. Charles Parish

Texas Co. No. 1 L.L.&E. Paradis, Sec. 39-14s-20e. 9⅝-in. csg. 8,975 ft.; drlg. sh. 10,082 ft.

St. James Parish

Shell Pet. Corp. No. 1 Shexnayder, Sec. 38-12s-15e. 9⅝-in. csg. 8,534 ft.; cg. sd., gas odor, 10,754 ft.

St. Martin Parish

Magnolia Pet. Co. No. 1 Mercelin, Sec. 8-10s-7e. Drlg. sh. 7,925 ft.
Roper & Todd No. 1 Levert Plantation, Lot 40, Sec. 42-10s-7e. Loc.

St. Mary Parish

Phillips Pet. Co. No. 1 Whitney Natl. Bnk., Sec. 13-15s-12e. T.D. 10,159 ft.; fsg.

Terrebonne Parish

Humble O. & R. Co. No. 1 W. E. Mount, Sec. 32-19s-19e. Loc.
Texas Co. No. 2 State-Coon Point, Twp. 23s-14e. 13⅜-in. csg. 1,900 ft.; T.D. 2,851 ft.; driving piling; bldg. drk.

TEXAS

Week Ending March 25

GULF COAST FIELDS

Hastings Field—Brazoria County

Humble O. & R. Co. No. 1 H. L. Beeck, B.S.&F. Sur. No. 6. Loc.

Old Ocean—Brazoria County

Harrison & Abercrombie No. 3 Armstrong Plantation, Polley & Chance Sur. T.D. 10,538 ft.; comp.; no ga.
Harrison & Abercrombie No. 5 Armstrong, Polly & Chance Sur. Drlg. sh. &L. 9,312 ft.
Harrison & Abercrombie No. 6 Bernard River Ld. & Dev. Co., C. Breen Sur. 9⅝-in. csg. 6,996 ft.; cg. sd.&sh. 10,236 ft.
Harrison & Abercrombie No. 4 Chenault, C. Breen Sur. 13⅜-in. csg. 1,523 ft.; drlg. sh.&L. 5,737 ft.
Harrison & Abercrombie No. 1 C. W. Markle, Polly & Chance Sur. Loc.
Sun Oil Co. No. 1 Borsodi-Elkins, C. Breen Sur. R.U.

Cedar Point—Chambers County

Standard Oil Co. of Texas et al No. 56-94 State. Cg. sh. 6,440 ft.

Seabreeze—Chambers County

Sun Oil Co. No. 1 Pipkin, W. M. Mays Sur. No. 104. T.D. 8,413 ft.; 7-in. csg. 8,407 ft.; tstd. oil and S.W.; cg. deeper.

Turtle Bay—Chambers County

Stanolind O. & G. Co. No. 1 Tassle Lotz, J. B. Jamison Sur. 9⅝-in. csg. 1,241 ft.; drlg. sh. 2,530 ft.

West Columbia—Brazoria County

Frost & Dunman No. 1 E. C. Parker, G. Tennille Sur. Drlg. sh. 4,626 ft.
General Crude Oil Co. No. 1-B Campbell, S. M. Williams Sur. Drlg. sh. 5,796 ft.
Texas Co. No. 5 Goldman, G. Tennille Sur. Drlg. sh.&L. 3,012 ft.
Texas Co. No. 12 Phillips G. Tennille Sur. Drlg. sh.&L. 4,027 ft.

Green's Lake—Galveston County

Sun Oil Co. No. 3 Houston Farms Dev. Co., D. Buckley Sur. T.D. 7,061 ft.; abd.

League City—Galveston County

Geo. Echols No. 3 Ross-Stewart, Perry & Austin Sur. 10¾-in. csg. 2,560 ft.
Midstates Oil Co. No. 2-A Maco Stewart, Perry & Austin Sur. T.D. 10,337 ft.; 7-in. csg. 9,146 ft.
Phillips Pet. Co. No. 1 Bertha Lobit Wilson, Perry & Austin Sur. Drlg. sh. 8,580 ft.
Phillips Pet Co. No. 1 J. C. Ott, S. F. Austin Sur. Cd. O.S. 7,070-9,110 ft.; T.D. 10,545 ft.; 5½-in. csg. on bttm.; perf. csg. 9,245-63 ft.; flwd. brksh. wtr some oil; perf. csg. 9,242-60 ft.; flwg. into pits; est. 12 B.F.P.H.; ⅛-in. ck.; 34% brksh. wtr.; killed to perf. csg. 9,110-15 ft.; flwg. 7 B.P.H.; ⅛-in. ck.; T.P. 3,125 lbs.; C.P. 3,500 lbs.
Phillips Pet. Co. No. 1 Stewart, Title Guaranty, S. F. Austin Sur. Top sd. 9,072 ft.; T.D. 9,274 ft.; P.B.; sdtrkd.; T.D. 9,333 ft.; cd. sd., oil odor 10,313-22 ft.; T.D. 10,400 ft.; 7-in. csg. 10,398 ft.
Salt Dome Oil Corp. No. 2 Ross-Stewart, Perry & Austin Sur. Drlg. sh. 8,555 ft.
West Prod. Co. No. 1 fee, Lot 2, Blk. 5, Perry & Austin Sur. Loc.

Bammel—Harris County

Hamill & Smith No. 1 Sweeney, W.C.R. R. Sur., Sec. 10, Blk. 4. 10¾-in. csg. 1,000 ft.
H. M. Harrell et al No. 2 John Ehrhardt, Geo. DeLesdenier Sur. T.D. 6,956 ft.; abd.

Clear Lake—Harris County

Humble O. & R. Co. No. 6-C Humble-West, Geo. B. McKinstry Sur. Top gas sd. 5,751 ft.; T. oil sd. 5,868 ft.; T.D. 5,913 ft.; W.O.C.

Clinton—Harris County

Stanolind O. & G. Co. No. 2 Edwards, Reels & Trobough Sur. Drk.

Eureka—Harris County

Jack Frazier No. 1 W. T. Helberg, H. Reinerman Sur. R.U.
Jack Frazier No. 2 Shady Acres, H. Reinerman Sur. Drlg. sh. 739 ft.
Houston Oil Co. No. 3 Helberg & Lackner, J. Reinerman Sur. Loc.
Houston Oil Co. No. 2 D. Lackner, H. Reinerman Sur. R.U.

Fairbanks—Harris County

Kirby Pet. Co. No 1. Daniels, S. S. Reynolds Sur. Cd. oil sd. 7,227-48¼ ft.; T.D. 7,252 ft.; perf. csg. 7,237-39 ft.; flwd. gas and S.W.; sqzd. perf.; reperf. csg. 7,203-11 ft.; C.O.; making 2,500,000 cu. ft. gas; killed; perf. csg. 7,002½-23½ ft.; tstd. gas and dist.; sqzd. off perf.; W.O.C.
Sinclair Prairie Oil Co. No. 1 Frazier, J. D. Egbert Sur. Drlg. sh. 3,769 ft.
Sinclair Prairie Oil Co. No. 3 Goodykoontz, W. S. Powell Sur. Loc.
Stanolind O. & G. Co. No. 1 W. F. Jahnke, 148-ac. tr., Sam Lewis Sur. T.D. 6,848 ft.; W.O.C.
Stanolind O. & G. Co. No. 2 Look, S. Lewis Sur. Loc.

Friendswood—Harris County

Humble O. & R. Co. No. 11-B Humble-West, Luke Hemenway Sur. Drlg. sh. 4,130 ft.
Humble O. & R. Co. No. 13-B Humble-West, Luke Hemenway Sur. T.D. 6,225 ft.; T. sd. 6,065 ft.; tstg.
Humble O. & R. Co. No. 16-B Humble-West, Luke Hemenway Sur. Top sd. 5,953 ft.; T.D. 6,040 ft.; I.P. 600 B.P.D.; ¼-in. ck.
Humble O. & R. Co. No. 1 J. T. Moore, A. Whitlock Sur. T.D. 6,046 ft.; W.O.C.
Humble O. & R. Co. No. 13 West Prod. Co., Luke Hemenway Sur. Drlg. sh. 2,612 ft.

Satsuma Field—Harris County

Moore & Ahern et al No. 1 Zagist, F. Fry Sur. Drlg. sh. 2,736 ft.
H. E. Williams et al No. 1 Cruice, T. Hogan Sur. Drlg. sh. 1,036 ft.

Cheek—Jefferson County

Humble O. & R. Co. No. 2 Broussard, C. Hillebrandt Sur. Loc.
Humble O. & R. Co. No. 2 Broussard Tr., C. Hillebrandt Sur. Drlg. pits.
Humble O. & R. Co. No. 3 Jefferson Ld. Co., C. Hillebrandt Sur. Top oil sd. 7,714 ft.; 5½-in. csg. 7,722 ft.; D.D. to T.D. 7,724 ft.; made sqz. job 7,717-19 ft.; W.O.C.
Humble O. & R. Co. No. 1 Pitre, C. Hillebrandt Sur. Top oil sd. 7,714 ft.; 5½-in. csg. 7,723 ft.; T.D. 7,724 ft.; tstg.
Humble O. & R. Co. No. 1 Margaret Todd, Wm. Carr Sur. Bldg. road.
Shell Pet. Corp. No. 1 Steinhagan, Wm. Carr Sur. T.D. 7,720 ft.; flwg. dist.

La Belle—Jefferson County

Sun Oil Co. No. 5 Broussard-Hebert, T. &N.O. Sur. No. 207. 18⅝-in. csg. 130 ft.

Cordele—Jackson County

H. J. Porter No. 1 Woussi, Peter White Sur. Loc.

Esperson—Liberty County

General Crude Oil Co. No. 1 Burgess et al, A. McNeil Sur. T.D. 8,215 ft.; abd.

Hardin—Liberty County

Atlantic Ref. Co. No. 1 Humphrey, F. Hardin Sur. T.D. 7,696 ft.; W.O.C.
Gulf Oil Corp. No. 4 Cessna, H. B. Johnston Sur. R.U.
Texas Co. No. 2 Smith, A. A. Hardin Sur. Drlg. sh. 4,736 ft.

Orange—Orange County

Continental Oil Co. No. 18 Chesson, Wm. Dyson Sur. T.D. 5,512 ft.; reperf. csg. 5,491-95 ft.; cleaned hole; P.B.; sdtrkd.; T.D. 5,530 ft.; tstg.
Gulf Oil Corp. No. 10-A Winfree, Wm. Dyson Sur. Loc.
John Mayo No. 1 M. J. Williams, Dyson Sur. R.U.
Ryan et al No. 3 Chesson, Wm. Dyson Sur. T.D. 5,937 ft.; T. sd. 5,925 ft.
Union Prod. Co. No. 5 Lutcher Moore, J. Dyson Sur. S.D. 5,831 ft.

Ace—Polk County

Dick Schwab No. 1-C Kirby-West Lbr. Co., G. A. Thomas Sur. Loc.
Shell Pet. Corp. No. 1 Doucett, P. A. Sublett Sur. Cg. sh. 8,223 ft.
Shell Pet. Corp. No. 2 Doucett, P. A. Sublett Sur. Loc.

Segno—Polk County

Gulf Oil Corp. No. 4 Quinn, A. Morales Sur. R.U.
Gulf Oil Corp. No. 1 Ragan, I.&G.N. Sur. No. 15. R.U.
Gulf Oil Corp. No. 5 Ragan, I.&G.N. Sur. No. 15. Loc.
Gulf Oil Corp. No. 16 Wing, I.&G.N. Sur. No. 14. Drlg. sh.&L. 6,037 ft.
Humble O. & R. Co. No. 11-BX Kirby, M. Victor Sur. Drlg. sh. 7,639 ft.

Spurger—Tyler County

Republic Prod. Co. No. 18 fee, N. Hurd Sur. T.D. 7,736 ft.; 7-in. csg. 7,734 ft.

Katy—Waller County

Magnolia Pet. Co. No. 1 Allsup, E. B. Conch Sur., Sec. 108. R.U.

GULF COAST WILDCATS

Brazoria County

Crosby Drlg. Co. No. 1 Geo. S. Wilson, A. C. Reynolds Sur. 10¾-in. csg. 2,925 ft.; T.D. 9,012 ft.; S.D.
Fabriguze et al No. 1 Freeport Sulphur, Stephen F. Austin Sur. (Bryan Mound). M.I.M.
Hamman Explin. Co. No. 1 Darrington, Achilles McFarland Sur. 10¾-in. csg. 1,200 ft.; drlg. sh. 6,995 ft.
Housh & Thompson No. 1 Lula Allen, Kate Ehrmann Sur. Loc.

Chambers County

Geo. Anderson No. 1 Julia Casey, W. D. Smith Sur. Loc.
L. D. Roberts No. 1 C. H. Lang, T.&N. O. Sur. No. 35. Drk.; (cor.).

Harris County

H. C. Cockburn No. 1 Lena Griffith, Adam Sur. Loc.
Sam Harrison No. 1 Minnetex Co., Wm. Lovett Sur. Drlg. 2,620 ft.
H. H. Givens No. 2 F. K. Adone, David Middleton Sur. Drk.
Midwest Royalty Co. No. 1 Westmoreland Farms, Lot 12, Blk. 39, James Wells Sur. Drlg. sh. 3,560 ft.

Jefferson County

I. E. Harwell No. 1 State, Gulf of Mexico. T.D. 5,840 ft.; D.S. stk.; pulled in two; S.D.
Hebert & Smith No. 1 Stella Turner, J. Gerish Sur. R.U.
Humble O. & R. Co. No. 13-B McFaddin-State, Sec. 8. 10¾-in. csg. 2,758 ft.; T.D. 5,859 ft.; D.S. stk.; backed off at 3,688 ft.; P.B. 4,220 ft.; sdtrkd.; T.D. 6,014 ft.; sdtrkd.; T.D. 6,115 ft.; P.B.; sdtrkd.; 7-in. csg. 5,919 ft.; T.D. 6,572 ft.; heaving sh.; rmg.
Navarro Oil Co. et al No. 1 T. F. Koch, Flutero Lopez Sur. T.D. 8,661 ft.; fsg.

Matagorda County

Maja Oil Co. No. 1 Robbins, A. Sheppard Sur. R.U.
Pierce Est. No. 1-P fee, B. J. Rawls & O. H. Stout Sur. T.D. 4,803 ft.; fsg.
Sun Oil Co. No. 1 Cavallin, Theo. F. Koch subd., John Duncan Sur. 9⅝-in. csg. 8,502 ft.; T. gas sd. 9,313 ft.; T.D. 9,582 ft.; 7-in. csg. 9,582 ft.; perf. csg. 9,300-18 ft.; flwg. gas, mud, and S.W.; ⅛-in. ck.; T.P. 2,200 lbs.; C.P. 1,950 lbs.

Montgomery County

Deep South Pet. Co. No. 1-A Foster Lbr. Co., Pryor Bryan Sur. Loc.
O. C. Garvey et al No. 1 Foster Lbr. Co., Neil Martin Sur. Loc.
Housh & Thompson No. 1 Graham M. Corner Sur. R.U.
H. A. Pennington et al No. 1 F. L. Banker, L. M. H. Washington Sur. S.D. 1,033 ft.
J. Smith et al No. 1 J. V. Scott, F. A. B. Wheeler Sur. S.D. 3,623 ft.

Newton County

Sun Oil Co. No. 1 Peavy-Moore Lbr. Co., T.&N.O.R.R. Sur. Drlg. sh. 6,810 ft.

San Jacinto County

J. W. Frazier No. 1 Annie Smith, J. D. Martinez Sur. No. 10. Loc.
Carl Keels et al No. 1 Ed Mays, Lot 7, R. O. Lusk Sur. Loc.

Tyler County

J. C. Bonham No. 1 Kountze, F. M. McReynolds Sur. R.U.

Washington County

Mount Selman Oil Co. No. 1 Fritz Fuelberg, John Lightfoot Sur. R.U.

Wharton County

Humble O. & R. Co. No. 1 J. D. Ecker, Beaty Seale & Forwood Sur. Drlg. sh. 1,138 ft.

S. W. TEXAS WILDCATS

Bell County

M. M. Gordon No. 1 Steele, Oliver T. Tyler Sur. S.D. 1,201 ft.
G. P. Shelton et al No. 1 Nelson, Michael Griffin Sur. S.D. 1,208 ft.

Bexar County

Fred Beatty No. 1 Joppich, Iginio Tejado Sur. No. 186. 6⅝-in. csg. 575 ft.; S.D. 803 ft.; prep. to D.D.
H. G. Krumm No. 1 Kempf, Samuel McCollough, Jr., Sur. 54. T.D. 770 ft.; tstg. on pmp.; pmpg. small amt. oil.
L. L. Skaggs No. 1 Braubach, Fernando Rodriquez Sur. S.D. 325 ft.

Brooks County

Humble O. & R. Co. No. 5 McGill Bros., La Bianca gr. D.S.T. 6,099-6,107 ft.; rec. 550 ft. oil; 75 lbs. press.; cg. 6,115 ft.

Caldwell County

Ben H. Fuchs No. 1 Chamberlain, Jos. Burleson Sur. S.D. 1,230 ft.

Calhoun County

Continental Oil Co. No. 1 J. J. Welder, Eusebio Hidalgo gr. Spd.

De Witt County

Richardson et al No. 1 W. D. McCurdy, John Hunt Sur. T.D. 150 ft.

Duval County

Ark. Fuel Oil Co. and Taylor Ref. Co. No. 1 Parr, Pedro Saen Sur. No. 12. Drlg. sh. 2,816 ft.
G. C. Glasscock No. 1 Nicholas Garcia, Santa Cruz De Concepcion gr. S.D. 4,039 ft.
Gravis and Doran No. 1 Parr, San An. T.D. 6,281 ft.; P.B. 5,890 ft.; 20-min. D.S.T. 5,860-90 ft. rec. 1,130 ft. gas-cut mud; 7-in. csg. 5,998 ft.; perf. csg. 5,865-74 ft.; tstd. S.W.; abd.
Frank Gravis No. 3 Schallert, Seale, Morris & Seale Sur. No. 2550. T.D. 3,168 ft.; P.B. 1,800 ft.; sdtrkd.; drld. into old hole 2,000 ft.; T.D. 3,168 ft.; set plug; W.O.C.
Henderson Coquat et al No. 1 Southland Life Ins. Co., Sec. 7, Ball Ranch subd., Santos Flores gr. Drlg. sh. 3,075 ft.
Lanning & Coffield No. 1 W. R. Peters, G.B.&C.N.G.R.R. Sur. No. 27. Drlg. sh. 1,536 ft.
Luling O. & G. Co. No. 1 Pope Dimitt,

Jose Marcelo Ynojosa gr. 10-in. csg. 561 ft.; S.D. 4,802 ft.

Magnolia Pet. Co. No. 1 Denman, Santos Garcia gr. Drlg. 856 ft.

J. G. Mayo et al No. 1 Hoffman, San Diego de Arriba gr. Drlg. sd. 5,229 ft.

Republic Prod. Co. No. 1 Society for the Propagation of Faith, Julian Reyes Sur. R.U.

Texas Gulf Prod. Co. No. 1 John Dunn, Diego Ynojosa gr. R.U.

Transwestern Oil Co. No. 19 Duval Co. Ranch Co., P. Martinez Sur. 368. T.D. 1,987 ft.; abd.

W. A. Wagner No. 1 D. J. Weikel, John H. Gibson Sur. No. 497. R.U. and S.D.

Goliad County

L. A. Douglas et al No. 1 Geo. A. Ray, S. J. Gomez Sur. Cg. 3,846 ft.

Eltobilt Oil Co. No. 1 Pettus, Maria De Jesus Yvarvo Sur. Drlg. 6,348 ft.

Martex Oil Co. No. 1 Wm. F. Albrecht, Thos. Hancock Sur. T.D. 5,312 ft.; perf. csg. 5,230-38 ft.; flwd. ½ bbl. dist. per hr.; ⅝-in. ck.; 5,500,000 cu. ft. gas.

Gonzales County

Otton Elder No. 1 Wilkinson, Russell Ward Sur. S.D. 425 ft.

H. F. Hinds No. 1 Dubose, E. G. Coffman Sur. 10-in. csg. 37 ft.; T.D. 2,696 ft.

Guadalupe County

Diamond Half Oil Corp. No. 1 Jacobs, B. Fuqua Sur. T.D. 2,969 ft.; abd.

Joseph Holefield No. 2 Claud Bredmax, John G. King Sur. Drlg. 1,633 ft.

John Hueners No. 1 Boecker, John Baker Sur. No. 26. S.D. 915 ft.

Hidalgo County

Rowan & Hope No. 1 Antonio Bazan, San Ramon gr., Juan Faris Sur. No. 4. M.I.M.

Jim Hogg County

A. W. Dillard No. 1 Julian Ramirez, John S. Williams Sur. T.D. 1,980 ft.; tstg.

Humble O. & R. Co. No. 9 Bass, San Raphael gr. Loc.

Humble O. & R. Co. No. 6 McGill Bros., south offset to No. 8 Bass. T.D. 4,785 ft.; abd.

Humble O. & R. Co. No. 1 Mestena O. & G. Co., Fowler & Rankin subd., Pallitos Blanco gr., R. G. Sars Sur. 16-in. csg. 70 ft.; T.D. 2,007 ft.; 10¾-in. csg. 1,563 ft.; D.S.T. 5,096-5,116 ft.; drlg. sh. 6,001 ft.

Imperial Oil Co. No. 1 Jose M. Gutierrez H. Rodriquez Sur. No. 142. R.U.

Johnson & Robinson No. 1 Palacios Mary Montgomery Sur. Drlg. sdy. sh. 2,502 ft.

Neal and Shaw No. 1 Armstrong, Hooper & Wade Sur. R.U.

Jim Wells County

F. A. Gillespie & Sons No. 1 Shear, Blk. 24, Adam Beatty & Moulton Sur. 10¾-in. csg. 999 ft.; cg. sd. 6,212 ft.

Tom Graham No. 1 N. O. Adams, Macellino Lopez gr. T.D. 5,850 ft.; 5½-in. csg. 5,020 ft.; showed S.W.; sqzd. 4,928-38 ft.; perf.; W.O.C.

Tom Graham No. 1 Zappe, Lavaca gr. Loc.

Gravis & Doran No. 1 Lillian Mull, J. Poitevent Sur. R.U.

H. H. Howell No. 1 Charles Mull, Lot 66, L. G. Collins Farm Lots. Drlg. sh. 4,627 ft.

Ike Howeth No. 1 O. S. Adams, Sec. 122, Wm. Adams Sur. Drlg. sh. 1,537 ft.

Magnolia Pet. Co. No. 1 Samuel Maun. Los Olmos y Loma Blanca gr. 7-in csg. 6,314 ft.; T.D. 7,560 ft.; run elec survey; cmtd. 5-in. lnr. at 7,257 ft.; perf. csg. 7,155-65 ft.; D.S.T. failed; perf. csg. 7,093-7,110 ft.; tstd. S.W.; perf. csg. 6,560-70 ft.; flwg. at rate of 105 bbls. dist. per day; ⅛-in. ck.; T.P. 2,175 lbs.; C.P. 2,325 lbs.; grav. 60.

W. H. Mathews No. 1 Frances Clark, Los Precenos gr. 10¾-in. csg. 617 ft.; tstd. 450 lbs. press.; 1 qt. oil on D.S. T. 5,141-58 ft.; 5½-in. csg. 5,309 ft.; T.D. 5,319 ft. (cor.); perf. csg. 5,202-12 ft.; tstd. S.W.; perf. csg. 5,138-42 ft.; flwd. 5 bbls. dist. per day; 9/64-in. ck.; killed well; reperf. csg. 4,825-35 ft.; flwd. est. 25 B.F.P.D., 99% S.W.; T.P. 140 lbs.; C.P. 720 lbs.; perf. csg. 4,805-18 ft.; rec. 4,600 ft. S.W.; perf. csg. 4,805-14 ft.; flwg. 5 bbls. dist. per day; 7/64-in. ck.; T.P. 540 lbs.; C.P. 1,750 lbs.

Sheli Pet. Corp. No. 1 2 Von Blucher, Lucinda Best Sur. Drlg. 60 ft.

Texas Gulf Prod. Co. No. 1 A. M. Perez, La Tinaja de Lara gr. R.U.

Kenedy County

Humble O. & R. Co. No. 1 Kenedy rnh., Penaseal gr. Drlg. sd. 5,567 ft.

Lavaca County

H. L. Edwards et al No. 1 Frank Rather, M. Wooten Sur. T.D. 5,318 ft.

Lee County

Fred Pederson et al No. 1 Brown, David Hudson Sur. T.D. 6,404 ft.; acd.; R.U.; pmpd. 100 bbls. fluid; 36 hrs.; 3 bbls. oily emulsion, bal. S.W.; dpnd. to T.D. 6,424 ft. fluid standing; 5,000 ft. S.W. and oil; P.O.P.; pmpg. at rate of 5 B. O. and 50 to 100 bbls. wtr. per day.

Live Oak County

Bruce Albright No. 1 Texas Joint Stock Ld. Bnk., J. Poitevent Sur. No. 197. T.D. 1,225 ft.; fsg.

Harry Hotchkin No. 1 Wade, J. Sommers Sur. No. 147. T.D. 2,438 ft.; abd.

L. W. Stieren No. 3 Lange, Thos. Adams Sur. T.D. 1,497 ft.

McMullen County

Holbrook and O'Farrell No. 1 Miles, J. Poitevent Sur. S.D. 1,003 ft.; tstg. sd. 968-75 ft.; showed wtr.; T.D. 1,514 ft.; S.D.; abd.

Mid-Western Pet. Corp. No. 1 C. E. Byrne, Geo. Pittuck Sur. R.U.

C. D. Scarborough and Biglane No. 1 Paul Foyt, James Garner Sur. No. 6. S.D. 1,228 ft.

R. M. Strum and Womack No. 1 Smith and Leischner, A. Zumwalt Sur. S.D. 1,358 ft.

Medina County

F. J. Carle No. 1 Tom J. Bendale, J. Barnhart Sur. No. 593. Drlg. sh. 335 ft.

J. I. and J. W. Cromwell No. 1 Tschirhart, I. J. Rogers Sur. No. 18. Drlg. 676 ft.

Victor Ziegler No. 1 Paul Haby, Wm. G. Still Sur. No. 1. Fsg. 980 ft.

Milam County

Alex Krause No. 1 Graves, Jackson Hall Sur. S.D. 900 ft.

Nueces County

H. D. & H. Oil Co. No. 1 Wright, V. L. De Herrera gr. S.D. 5,890 ft.

Shell Pet. Corp. No. 1 Griffith, Vicente Lopez de Herrera gr. Cg. sh. 6,851 ft.

Refugio County

Copano Oil Co. No. 4-C O'Connor, Timothy Hoyt Sur. (Mellon Creek). Cg. 5,796 ft.

Copano Oil Co. No. 5-C O'Connor, Timothy Hoyt Sur.; (Mellon Creek). Cg. 5,826 ft.

Quintana Pet. Corp. No. 3-B O'Connor, Timothy Hoyt Sur., 5,800 ft. S of Mellon Creek field. Spd.

Royal O. & G. Corp. et al No. 1 M. L. Oppenheimer, Antonio De la Vina Sur. (Bonnieview field). Drlg. sh. 5,327 ft.

San Patricio County

Smith O. Morgan No. 1 H., S. J. Pollan Sur. Drlg. sh. 5,150 ft.

Plymouth Oil Co. No. 1 Wilson, John Brown Sur. T.D. 7,038 ft.; abd.

Starr County

Banks Miller Oil Co. No. 2 Garcia, Juan Salinas Porc. No. 71. T.D. 665 ft.; abd.

Magnolia Pet. Co. No. 1 M. M. Garcia, S. Vela Porc. No. 90. Drlg. sh. 4,368 ft.

Rhinehart and Bowman No. 1 Bowman. J. C. McCarty Sur. Drk.

Sun Oil Co. No. 1 Olivarez, C.C.S.D.&R. G.N.G. Sur. T.D. 5,650 ft.; 7-in. csg. 5,330 ft.; perf. csg. 4,129-35 ft.; tstg.

Sun Oil Co. No. 3 Olivarez, C.C.S.D.&R. G.N.G. Sur. No. 239. T.D. 4,730 ft.; cd oil sd. 4,675-93 ft.

Sun Oil Co. No. 1 G. H. Speer, C.C.S.D.& R.G.N.G. Sur. Cg. 4,610 ft.

W. W. Zimmerman No. 2 M. S. Tijerina, H.E.&W.T.R.R. Sur. No. 299. Drlg. 750 ft.

Travis County

E. A. Fields and M. T. Paine No. 1 Pete Carlson, Robt. Fletcher Sur. No. 69. Drlg. sh.&shls. 398 ft.

Oscar Raesz et al No. 1 J. W. Swahn, Phillips McElroy Sur. No. 16. S.D. 525 ft.

Webb County

Brazos Young Corp. No. 1 A. M. Bruni, J. Borego gr. Drlg. sh. 3,030 ft.

Gilcrease Oil Co. No. 1 W. E. Trafton, J. Poitevent Sur. No. 281. Drlg. sh. 1,015 ft.

J. M. Hardie No. 1 J. M. Garcia, Blk. 27 of Hughes Pet. Co. Mineral subd., Los Ojuelos. 5½-in. csg. 1,840 ft.; T.D. 1,848½ ft.

A. E. Heniger No. 1 M. Guerra, Juan P. Yzaguirre Porc. No. 56. Drlg. 20 ft.; no report.

Johnson and Robinson No. 1 Mabel Adami, A.B.&M. Sur. No. 35. S.D. 647 ft.

Navarro Oil Co. No. 1 Rosa V. Benavides, Josefa Cuellar gr. Loc.

Smith & Storey No. 1 Houston Oil Co., R. O. Barnsley Sur. No. 24. T.D. 2,445 ft.; 5½-in. csg. 1,830 ft.; perf. csg. 1,834-65 ft.; swbg.

Willacy County

Cockburn et al No. 1 Yturria Ld. Livestock Co., San Juan de Carricitos gr. 10¾-in. csg. 1,228 ft.; cg. oil sd. 4,857-67 ft.; D.S.T. rec. 60 ft. oily mud; cg. sh. 7,250 ft.

Williamson County

W. O. Caffey No. 1 J. Seggern, Hardy Pace Sur. Drlg. 200 ft.

Fritz Fuchs No. 1 Adolph Schultz, Jefferson West Sur. Drlg. sh. 112 ft.

Zapata County

C. M. Lake et al No. 1 T. Vela, T.&N.O. Sur. No. 5. T.D. 2,511 ft.; abd.

EAST TEXAS

(Border Counties)

Harrison County

Ark.-La. Gas Co. No. 1 Jim Davis, James Adams Sur. Drlg. L. 3,243 ft.

Long et al No. 1 Taylor, H. Martin Sur. Drlg. 3,285 ft.

Marion County—Rodessa

Ark. La. Gas Co. No. 1 Hurst, A. D. S. Coy Sur. R.U.

Cabie Tool Drlg. Co. No. 1 Jackson, John Hanks Sur. Drlg. L.&sh. 5,231 ft.

Gulf Oil Corp. No. 1 C. Ray, John Hanks Sur., NW cor. lse. 9¾-in. csg. 1,910 ft.; set 5½-in. csg. 6,003 ft.; T.D. 6,021 ft.; drld. plug; swbg.

Harry Hanbury et al No. 2 Davis, Wm. R. Meyers Sur. 5½-in. csg. 5,975 ft.; Young sd. 5,979-87 ft.; T.D. 5,990 ft.; comp.; 798 B.P.D.; ¼-in. ck.; T.P. 500 lbs.; C.P. 750 lbs.; used 3,000 gal. acd.

Marion County—Other

Tom Bell No. 1 Moseley, D. Lane Sur. T.D. 2,622 ft.; bailing wash wtr.; S.S.O.

Exploroil Co., Inc., No. 1 Susie Chatten, I. N. Jones Sur. Nac. sd. 1,186-94 ft.; S.D. 2,600 ft.; W.O.

Fitzwater et al No. 1 Terry, Gains Coor Sur. Drlg. 462 ft.

Van Horn & Clements No. 1 Berk, G. Coore Sur. S.D. 1,172 ft.

Shelby County

Neal & McDaniel No. 1 C. W. McDaniel, Wm. Snider Sur. Drlg. 4,580 ft.

Paul Pewitt No. 1 Rushing Est., Mannon Smith Sur. Drlg. 2,283 ft.

WEST TEXAS WILDCATS

Andrews County

Atlantic and Standard No. 1-B Cowden. Sec. 1, Blk. 14, T.&P. Sur. P.B. 4,180 ft.; S.D.

J. W. Tripplehorn No. 1 M. A. Thornberry, Sec. 2, Blk. 42-A. S.D. 4,480 ft.

Borden County

Continental Oil No. 1 L. S. Monger, Sec. 38, Blk. 31, T.&P. Sur.; 4,000-ft. test. Drlg. 2,975 ft.

Brewster County

H. D. Wilcox No. 2 Kokernot, Sec. 23. Blk. C, J. V. Massey Sur. Drlg. 300 ft.

Cochran County

T. G. Shaw, Tr., No. 1 Carrie S. Dean, Lge. 94. Swbg. 12 B.F.P.H., 4,981 ft.; swbg. and tstg. 4,982 ft.

Concho County

Clymore Co., Inc., No. 1 Hill, J. Frederick Sur. No. 1694. Drlg. 1,605 ft.

Crane County

Great Western Prod. No. 1-B Univ., Sec. 5, Blk. 30, Univ. Sur. W.O. pmp., 3,419 ft.; swbd. 127 B.O. in 12 hrs.; comp. 127 B.O.P.D.

Gulf Oil Corp. No. 5 M. B. McKnight, Sec. 1, Blk. 21-B, P.S.L. Sur. Drlg. 2,875 ft.

Magnolia Pet. Co. No. 12 W. P. Edwards, Sec. 12, Blk. 23-B, P.S.L. Sur. Tstg. 3,529 ft.

Crockett County

Hanson & Anderson No. 1 W. T. Knoelke, Sec. 30, Blk. GG, H.E.&W.T. Sur. Spd. and S.D.

Humble No. 1 Ozona-Barnhart, Sec. 4, Blk. M-N, G.S.&F. Sur. Drlg. 5,754 ft.

Culberson County

Harry Niehaus No. 1 Caldwell, Blk. 109, Sec. 13, P.S.L. Sur. Drlg. 4,933 ft.

Quito Oil Co. No. 1 Cameron Lbr. Co., Sec. 24, Blk. 81, P.S.L. Sur. S.D.R. 945 ft.

Dawson County

Daw-Tex Oil No. 1 J. E. Neely, Sec. 28. Blk. 35, T.&P. Sur. Cmtd. 7-in. 4,369 ft.; pulling collapsed 7-in. at 4,450 ft.; W.O.C. 3,751 ft.; cmtd. whipstock; drlg. by csg. 4,010 ft.

Dickens County

Bond D. Jones No. 1 Ford et al, I.&G.N. Sur. Drlg. 3,661 ft.

Humble O. & R. Co. No. 1 Matador Ld. & Cattle Co., Sec. 26, Blk. 1, Shock & Arnold Sur. Drlg. 6,710 ft.

Ector County

M. B. K. Drlg. Co. No. 2 Gist, Sec. 9, Blk. 42, T.&P. Sur. Drlg. 1,350 ft.

R. R. Rhodes No. 1 J. L. Johnson, Sec. 43, Blk. 42, T.&P. Sur. Comp.; 394 B. O.P.D.

Sinclair Prairie No. 1 Fay Holt, Sec. 1, Blk. A, P.S.L. Sur. 4,217 ft.; comp.; 561 B.O.P.D.

El Paso County

Tri-State Oil Co. No. 1 Kinkel. S.D. 3,571 ft.

Gaines County

Osage Drlg. Co. No. 1 E. H. Jones, Sec 20, Blk. 7-A, P.S.L. Sur. Drlg. 2,300 ft.

Garza County

Gulf Oil Corp. No. 1 Swanson, Sec. 25, Blk. 2, H.&G.N. Sur. Flwd. 148 B.O. in 9 hrs.; P.B. depth of 7,400 ft.; P.B. 6,821 ft.; tstd. S.W.; P.B. 6,134 ft.; tstg.; drld. out to 6,857 ft.; P.B. 6,296 ft.; swbg and tstg.

Glasscock County

B. A. Duffy No. 1 Carter-Shell, Sec. 8, Blk. 33, T.&P. Sur. S.D. 2,160 ft.

J. R. Petty No. 1 Joe Blake, Sec. 163. Blk. 29, W.&N.W. Sur. U.R. 690 ft.; T.D. 727 ft.

Hockley County

S. W. Richardson No. 1 A. E. Coe Lbr. 53, Lge. 40, Maverick C.S.L. Sur. Cd. several zones of sat.; P.B. 5,143 ft.; tstg. wtr. shutoff; flwd. 12 B.P.H.; P.B. 4,982 ft.; flwd. 15 B.O.P.H.; comp. 2,048 B.O.P.D.

Texas Co. No. 1-C Mallett, Lbr. 11, Lge. 51, Scurry C.S.L. Sur. Drlg. 2,230 ft.

Howard County

A. Delcambre, Jr., No. 1 M. H. O'Daniels, Sec. 39, Blk. 30, T.&P. Sur. Loc.

Dick Graham No. 1 P. Johnson, Sec. 34, Blk. 32, T.&P. Sur. Loc.

Ooley & McQuain No. 1 O'Daniels, Sec. 39, Blk. 30, T.&P. Sur. Drlg. 1,225 ft.

T. G. Shaw, Tr., No. 1-B Wilkerson, Sec. 19, Blk. 34, T.&P. Sur. D.&A. 3,787 ft.

Hudspeth County

Haymon Kroupp Oil & Ld. Co. No. 1 Thaxton, SE¼ Sec. 34, Blk. 74, Twp. 6. Drlg. 6,028 ft.; S.G.

Haymon Krupp No. 1 Briggs, Sec. 24, Blk. 73, Twp. 7, T.&P. Sur. W.O.C. 5,365 ft.

Irion County

J. W. Ellis No. 1 Sol Mayer, Sec. 240; Blk. 1, T.&P. Sur.; 2,100-ft. test. Lost hole, skidded 10 ft. east. Drlg. 1,910 ft.

Lynn County

John L. Baldridge No. 1 Alma Lbr. Co., Sec. 151, H.E.&W.T. Sur. W.O.C. 4,450 ft.

Martin County

T. G. Shaw, Tr., No. 1 Wilkerson, Sec. 35-A, B.&C. Sur. S.D. 3,787 ft.

Pecos County

Geo. T. Abell No. 1 W. Williams, Sec. 11, Blk. 3, H.&T.C. Sur. D.&A. 2,464 ft.

Ben Dansby No. 1 L. C. Lessenich. Sec. 45, Blk. 9, H.&G.N. Sur. Drlg. 1,650 ft.

Leidecker & Cain No. 1 M. M. Lehn, Sec. 71. Blk. 10, H.&G.N. Sur. Drlg. 650 ft.

O. E. Schade No. 1 Otis Garrett, Sec. 59½, Blk. 8, H.&G.N. Sur. Drlg. 2,267 ft.

Thomason Prod. Co. No. 1 Notions, Sec. 1, Blk. 105, W. P. Howard Sur. Drlg. 1,950 ft.

S. Thompson No. 1 Elsinore Cattle Co., Sec. 54, Blk. D, G.C.&S.F. Sur. Rig burned; dropped bailer in hole; S.D.O. 7,342 ft.

J. C. Trees No. 1 fee, Sec. 63, Blk. 3, H.&G.N. Sur. C.O. 2,047 ft.; S.O.

C. W. Williams No. 1 J. Eaton, Sec. 1, Blk. 203, J. H. Handy Sur. Loc.

C. W. Williams No. 1 T.&P. Ld., Sec. 95, Blk. 3, T.&P. Sur. Loc.

Reeves County

Artie Baker No. 1 J. W. Grider, Sec. 31. Blk. 58, P.S.L. Sur. S.D.R. 450 ft.

Schleicher County

Lone Star Gas Co No. 1 Bert Page, Sec. 30, Blk. L, G.H.&S.A. Sur. Drlg. 4,750 ft.

Lone Star Gasoline Co. No. 2 Bert Page, Sec. 46, Blk. L, G.H.&S.A. Sur. Drlg. 2,525 ft.

Scurry County

Coffield & Guthrie No. 1 First Natl. Bk., Snyder, Sec. 29, Blk. 97, H.&T.C. Sur. Prep. re-treat 3,185 ft.

Stonewall County

Shell Pet. Corp. No. 1 T. K. Smith, Sec. 143, Blk. 1, H.&T.C. Sur. Loc.

Tom Green County

Dan Short et al No. 1 J. G. Davidson, NW part of Lovie P. Moore Sur. Spdg.

Southern Cross No. 1 Upton & Upton, Sec. 20, Blk. A, A.B.&M. Sur. Drlg. 1,722 ft.

Spinner No. 1 Reed, Mason Ferry Ranch Sur. Drlg. 5,720 ft.

Tom Green Oil Co. No. 1 Schreiber, A. Krending Sur. No. 1663. Drlg. 1,603 ft.

Upton County

White & Wilson No. 1 Webb, Sec. 176. Blk. 1, C.C.S.D.&R.G.N.G. Sur. Drlg. 2,525 ft.

Ward County

McQueen & Clevenger No. 1 Geo. Sealy, Sec. 47, Blk. F, G.M.M.B.&A. Sur. Drlg. 2,385 ft.

Geo. Wallace No. 1 R. Avery, Sec. 36, Blk. 1, H.&T.C. Sur. R.U.

Winkler County

Harding & Margan No. 1 Jenkins-Gulf, Sec. 13, Blk. 77, P.S.L. Sur. Loc.

Standard Oil, Texas, No. 2 Baird, Sec 13, Blk. 3-B, P.S.L. Sur. C.O. 3,357 ft.; flwd. 66 B.O. in 16 hrs.

Yoakum County

Osage Drlg. Co. No. 1 Miller, Sec. 898, Gibson Sur. Treating 5,106 ft.

Shell Pet. Corp. No. 1 J. M. Rutts, Sec. 743. P.B. 5,229 ft.; comp. 161 B.O.P.D.

Shell Pet. No. 1 Waples-Platter, Sec. 614. Drlg. 5,048 ft.

T. & P. Oil Co. No. 1 A. M. Brownfield, Sec. 802. Prep. C.O. 5,056-5,125 ft.; flwd. est. 50 bbls.

TEXAS PANHANDLE

Collingsworth County

C. H. Mee and C. F. Anderson No. 1 V. K. McCaskill, Sec. 18, Blk. 16, H.&G. N. Sur. Drlg. 2,234 ft.

Johnson No. 1 Taylor. S.D. 875 ft.

Deaf Smith County

Uscan No. 1 Farwell. S.D. 5,650 ft.

Donley County

Robinson No. 1 Kuteman, Sec. 88, Blk. 20, H.&G.N. Sur. S.D. 4,406 ft.

Gray County

Products O. & G. Co. No. 1 Mason Davis, Sec. 23, Blk. 23-M, H.&G.N. Sur. Loc.

Tripplehorn No. 2 Webb, Sec. 12, Blk. A-9, H.&G.N. Sur. Cl. out 2,665 ft.; installing pump.

Lipscomb County

Darrouzett Oil Co. No. 1 Pugh, 1½ mi. S and 1 mi. W of Darrouzette. S.D.; wtr. 3,401 ft.

Roberts County

Whitlock No. 1 Cunningham. Drlg. 4,210 ft.

E. C. TEXAS WILDCATS

Anderson County

Mayo & Cook No. 1 So. Pine Lbr. Co., R. Erwin Sur., 2 mi. W of Slocum. Drk. and R.U.

Angelina County

K. L. McHenry No. 1 J. S. Russell, A. Flores Sur., 4 mi. N of Lufkin. Drlg. 975 ft.

Cherokee County

C. C. Lanier No. 1 A. T. O'Neal, J. M. Procella Sur., 3 mi. E of Troup. Drlg. 3,290 ft.

Falls County

M. A. Hayes No. 1 D. G. Wooten, J. Powell Sur., 8 mi. SE of Lott. S.D. 18 ft.
Marshall Hayes No. 1 M. Murphy, J. M. Sanches Sur., 2 mi. NE of Lott. Comp. 33 B.O.P.D.

Freestone County

Jack Frazier No. 1 F. Marberry, 1½ mi. NE of Kirvin. D.&A. 3,836 ft.

Grayson County

John Grey No. 1 Freedman, W. S. Reeves Sur., 8 mi. NW Denison. S.D. 600 ft.
Jim McMurrey No. 1 Dr. T. J. Long, J. Garland Sur., 2 mi. S of Collinsville. 4,000-ft. test. S.D.O. 3,929 ft.
Ross & Marshall No. 1 J. N. Taylor, W. Moore Sur., 8½ mi. NW of Denison. S.D. 918 ft.

Houston County

Cities Service Oil No. 1 C. C. Hill, J. D. Procella Sur., 2 mi. W of Grapeland. R.U.
Leggett & Gossett No. 1 B. F. Gardner, J. Thorn Sur., just N of Weldon. D.&A. 2,200 ft.

Kaufman County

Sam Knoerr No. 1 J. B. Hunter, Walker Sur., 5 mi. S of Terrell. Drlg. 550 ft.
W. G. McGee No. 1 General American Life Ins. Co., John Baker Sur., 6 mi. W of Mabank. Pits.

Leon County

Humble O. & R. Co. No. 1 Ed F. Swift, H. W. Subbiett Sur., 4 mi. NW of Navarro Crossing field. Cg. 5,766 ft.; no shows.

Limestone County

H. Gant No. 1 Vol De Long, P. Varela Sur., 1½ mi. NW of Thelma. Prep. test upper shows 2,983 ft.
H. Richardson No. 1 Banks, B. Davis Sur., 2 mi. NE of Thornton. Drlg. 2,700 ft.
S. A. Thompson No. 1 R. L. Nance, J. D. Brown Sur., 5 mi. SE of Thornton. Drlg. 2,953 ft.

McLennan County

C. E. Porter No. 1 B. D. Burchett, De la Vega Sur., just SE Waco. S.D. 695 ft.

Navarro County

Guy Sitton No. 1 J. P. Fortson, T. J. Chambers Sur., 4 mi. E of Alma. S.D. 628 ft.
W. H. Strong No. 1 Emma Jackson, J. McNeal Sur., 10 mi. S of Corsicana. Drlg. 45 ft.

Rains County

McKinley & Hastings No. 1 McTaggert B. Milder Sur., 1 mi. W of Emory. S.D. 720 ft.

Red River County

Bentley-Sheppard & Stevens No. 1 So. Pine Lbr. Co., G. S. Parks Sur., 17 mi. N of Clarksville. D.&A. 1,847 ft.
Daniels No. 1 J. J. Gaston, Joseph Guest Sur., 2 mi. S. Detroit. Formerly abd. at 1,109 ft.; S.D. 1,274 ft.
Hampton, Osteen & Wooley No. 1 J. M. Roberts, J. Ware Sur., 12 mi. N of Clarksville. Loc.

Smith County

R. W. Rair No. 1 Clark, J. Lewis Sur., 2 mi. W Mt. Sylvan. D.&A. 5,388 ft.
J. H. Thomason No. 1 J. W. Bartlett, R. H. Stewart Sur., ½ mi. SE of Jamestown. Prep. set pipe 2,150 ft.

Trinity County

C. D. Davis No. 1 J. D. Gibson, A. Donavan Sur., 4 mi. NE of Trinity. Gas blowout 148 ft.; D.&A. at 2,630 ft.

Upshur County

Gaskill Oil No. 1 E. E. Arnold, J. Scott Sur., 2 mi. SE of Jamestown. R.U.
R. E. L. Johnson No. 1 Lizzie Parker, John B. Gay Sur. S.D. 4,004 ft.

Van Zandt County

F. A. Richardson No. 1-A B. C. Dodd, T. W. Hutchinson Sur., 2 mi. S of Grand Saline. S.D.R. 2,150 ft.

Wood County

Geo. Strake No. 1 Farrier, J. Walker Sur., 4 mi. E of Yantis. Drlg. 5,718 ft.

NORTH TEXAS WILDCATS

Archer County

British American O. P. Co. No. 1 T. B. Wilson, Sec. 12, H.&T.C. Sur. Drlg. 950 ft.
E. P. Griffin No. 1 W. T. Waggoner, Sec. 3, H.&T.C. Sur. O.S. 4,393-4,407 ft.; 6⅝-in. 4,388 ft.; W.O.T.; flwd. 105 bbls.; 1 hr.; through csg.
Phillips Pet Co. No. 1 J. B. Miller, Sec. 20, A.T.N.C.L. Sur. T.D. 4,006 ft.; O. W.D.D.; S.O. to D.D. to 4,500 ft.; C.O. 3,800 ft.
Shell Pet. Corp. No. 1 Bell Co. Sch. Lds., Blk. 47, Abst. 12. Drlg. 1,392 ft.
L. Sikes No. 1 Miller, Wm. Shaw Sur. A-378. 6⅝-in. cmtd. 5,218 ft.; W.O.C.

Baylor County

British Am. O. P. Co. No. 1 J. E. Cope, Sec. 220, T.&N.O. Sur. Drlg. 4,350 ft.

Clay County

Bridwell Oil Co. No. 1 Furd Halsell, Blk. 16, W.C.R.R. Sur. Drlg. 2,518 ft.
H. S. Moss No. 1 T. J. Parmley, Sec. 6s, M.G.S.L. Sur. A-308. Drlg. 379 ft.

Hardeman County

N. Gilbert No. 1 R. Weakley, Sec. 85, H. &T.C. Sur., 4,000-ft. test. Loc.

Cooke County

Means & Howard No. 1 W. T. Lynch, A. Edmiston Sur. A-353. Matl. for 5,000-ft. test. Spdg.
Needham & Richards No. 1 Peary, T. Toby Sur. A-1047. Drlg. 1,125 ft.

Jack County

Buttram Pet. Corp. No. 1 Cullers, Blk. 4, S.P.R.R. Sur. Drlg. 1,210 ft.
Pitzer & West No. 1 F. Warren, Sec. 2784, T.E.&L. Sur. 6⅝ 4,365 ft.; L. 4,365-4,418 ft.; tstg. est. 150 bbls.

Montague County

Benton & Holmes No. 1 J. Bowers, Sec. 55, M.E.P.&P. Sur. S.S.O. 2,887-95 ft.; 6⅝-in. 2,883 ft.; tstg. est. 500 to 600 B.P.D.
Cordova-Union Oil-Gillespie No. 1 Cable, Stephenson Sur., Abst. 462. Loc.
Staley Oil Co. No. 1 Nunnely, M. S. Ussery Sur. A-824. Drlg. 1,618 ft.

Wichita County

F. S. Freeland No. 1 J. D. Cooper, H. Hastie A-92; 4,000-ft. test. Spd. and S.D.

Wise County

H. Jackson No. 1 F. Neeley, Blk. 29, Matagorda Co. Sch. Ld. Spd. and S.D.
H. M. Muse No. 1 F. F. Kaker, Blk. 16, Matagorda Co. Sch. Lds. Pits.

Wilbarger County

Lawson & Leavell No. 16 W. T. Waggoner A. Sec. 109, H.&T.C. Sur., Blk. 14; 3,500-ft. test. Drlg. 1,012 ft.

Young County

G. E. Fagg No. 1 Gretchen Morgan, Sec. 3410, T.E.&L. Sur. Cellar.
H. M. Leidecker No. 1 J. M. Nall, Sec. 1997, T.E.&L. Sur. Rebldg. drk.; T.D. 2,625 ft.
Long & Lupton No. 1 A. Crouch, I.&G. N. Sur. A-1460. 6⅝-in. 3,865 ft.; sat. L. 3,940 ft.; treating with acid; test wtr.; S.D.O.

WEST CENTRAL TEXAS DISTRICT

Brown County

E. C. Norman No. 1 Stella Rice, Chas. Messenger Sur. No. 127. S.D. 997 ft.
A. D. Bruce No. 1 L. J. Mauldin, Sec. 15, H.&T.C. Sur. S.D. 520 ft.

Callahan County

Dobbs Oil Co. No. 1 Finley, Sec. 75, Bayland Orphans Home Ld. S.D. 1,875 ft.
J. C. Jackson and Doug. Tomlingson, Jr., No. 1 T. J. Thompson, Sec. 30, B.B.B. &C. Sur. S.D. 1,886 ft.
Pet. Prod. No. 1 J. M. Morrisset, SW¼ Sec. 91, Blk. 13, T.&P. Sur., 5 mi. NW of Clyde. Fsg. 835 ft.
Westgate-Greenland Oil Co. No. 1 Chas. Yost, SE¼ Sec. 23, Blk. 8, S.P.R.R. Sur., on Callahan-Taylor County line. Drlg. 780 ft.

Coleman County

E. E. Kirkpatrick No. 1 F. Nixon, Burnett, C.S.L. Sur. D.&A. 3,027 ft.

Comanche County

Comanche O. & G. Co. No. 1 J. E. McGuire, C. Rockefeller Sur. No. 3. Fsg. 2,910 ft.
E. T. DeArman No. 1 Moorman, Sec. 37, D.&D.A. Sur. C.O. 2,760 ft.

Eastland County

Dobbs Oil Co. No. 1 Greer, J. E. Hardy Sur., Ellenburger test. S.D. wtr. 2,213 ft.

Erath County

Wayne Chandler No. 1 Chandler, J. W. Moore Sur., Abst. 571. S.D.R. 4,151 ft.
Collard No. 1 W. L. Payton, H. Pierson Sur. No. 1, Abst. 1105. Temp. abd. 185 ft.

Jones County

Brown Eagle No. 1 Waterson, Andrews Sur. No. 191. T.D. 2,283 ft.; S.D.
R. B. Carrol No. 1 G. Herndon, Goliad C.S.L. Sur. S.D.O. after acid failed 2,677 ft.; may deepen.
Ed. L. Evans No. 1 B. J. Crier, Sec. 8, B.A.L. Sur. C.O. and rng. csg.
G. M. Gillispie No. 1, Sec. 54, O.A.L. Sur. D.&A. 2,351 ft.
S. C. Herring No. 1 Guitar Est., western part of F. Sieverman Sur. No. 12. Loc.

Palo Pinto County

W. K. Gordon No. 1 J. W. Conway, Ruidosa I.R.R. Sur. Fsg. 3,515 ft.

Canadian Fields

(Continued from Page 220)

ster, Saskatchewan, acreage being in Townships 47 and 48, Ranges 1 and 2w4. Arrangements are being made for drilling. Geological investigation indicates the acreage is high on structure. It has not been tested, though eight wells within a radius of 12 to 15 feet have secured encouraging shows of heavy crude around 2,000 to 2,250 feet. The nearest test, Rayco No. 1, LSD 3, Section 4-47-1w4, got numerous oil indications in the upper horizons but was abandoned in the top of the lime at 2,510 feet. The area is southwest of the Lloydminster oil and gas development and north of the Dina area, which has a small production of heavy crude. Tests carried to around 3,000 feet are expected to get a fair production of heavy crude from the overlying formations, with possibilities of lighter crude in the limestone.

Ontario Drilling

In the Dover field, Kent County, Ontario, Prairie Oil & Gas Co. No. 7, J. S. Thomas farm, E half Lot 5, Front concession, Raleigh Township, struck oil in the Trenton limestone between 3,242 and 3,265 feet. It was shot, and while cleaning out started to flow by heads. Tubing is being run and a production test made. Location was 2,000 feet east of the Rowe-Bruette gasser on the south bank of the River Thames close to Prairie Siding Bridge. Another test will be started 1,500 feet west of No. 7.

In Chatham Township, Kent County, F. A. Ogletree No. 2, Lot 13, Concession 5, is standing at 5,950 feet, corrected depth. The test, the deepest ever drilled in Ontario, got the Trenton limestone at 2,910 feet and is supposed to have entered the granite at 3,830 feet, though at 3,950 feet a tar-like paraffin substance was encountered in small quantities.

In the Malahide field, Elgin County, Union Gas Co. No. 6, Lot 17, Concession 5, Malahide Township, is below 1,050 feet, and expected to get the gas horizon within 100 feet. Union No. 7, Lot 19, Concession 6, is below 850 feet.

In the Brownsville field, Kidd-Adams No. 1, N half Lot 28, Concession 11, Dereham Township, west of the Humphrey gasser, finished with about 200,000 cu. ft. a day at around 930 to 940 feet depth. Oldreive & McKechnie No. 3, Silverthorn farm, Lot 2, Concession 10, Bayham Township, Elgin County, finished around 935 feet with 1,500,000 cu. ft. a day.

Ontario Shallow Fields

In the Warwick shallow field, Lambton County, Percy Jackson, drilling for Douglas Banks on the south end of the J. Albert Brush farm, Lot 30, Concession 5, Warwick Township, finished 62 feet in the lime with flush production around 100 bbls. a day. Two previous tests on the north end of the same farm finished dry. Doctor Vonberg No. 3 Lloyd Easterbrook farm finished a good producer. Newcombe Syndicate No. 1 on the Arthur Williamson farm, Lot 22, Concession 4, drilled by W. J. Hussey, finished at 443 feet, good for 5 to 7 bbls. a day. F. L. Davidson, drilling for the Buhler Syndicate of Birmingham, Mich., on the Bagg & Doyle farm, Lot 19, Concession 4, finished a dry hole, and is moving to a new location a mile west of Watford in Concession 4.

On the Sam Birchell farm, Heal-Birchall No. 1, finished last October at 376 feet with a flush of 110 bbls. is still making around 8 bbls. a day. No. 2, the best producer, is making around 30 bbls. No. 4 finished a small producer, and No. 5 is drilling on the same farm.

Several deep tests have been drilled in outlying portions of the field. P. L. Jackson of Dunnville, drilling for W. L. Forest and associates on the Dolan estate farm, Lot 10, Concession 2, Warwick, north and west of the main field, has a fishing job at 1,150 feet. A test by F. R. MacIntosh and W. J. Cole on the Victor Tait farm, Concession 2, Plympton, near Wanstead, finished a dry hole. South of the field, a deep test for Wilson & Sullivan on the G. W. Bowie farm, Lot 4, Concession 13, Brooke Township, got shallow oil at 460 feet with considerable water, and is shut down on account of bad weather. A shallow test drilled by Ernest Kells for Wilson & Sullivan on the O. V. Watt farm, Lot 24, Concession 14, Brooke Township, finished a dry hole.

In Chatham Township, Kent County, a series of tests drilled last year by E. P. Rowe in Concessions 1 and 2, just east of Chatham city, and south of the Thames in Concession 1, Harwich Township, encountered fair showings of crude in the shallow horizons. A deep test has been started on the Conliffe farm, Chatham Township, and is below 800 feet.

Rocky Mountain Runs

Production estimates for week ended March 25, 1939:

WYOMING	
Salt Creek	14,840
Big Muddy	1,170
Badger Basin	150
Byron	420
Cody dome	40
Cole Creek	90
Dallas Derby	510
Dewey dome	10
Dutton Creek	50
Elk Basin	590
Frannie	1,390
Garland	1,850
Grass Creek	1,830
Hidden dome	90
Hudson	230
LaBarge	1,020
Lance Creek	14,280
Lost Soldier	1,880
Mahoney	250
Medicine Bow	2,200
Mule Creek	200
Midway	30
Oregon Basin	1,250
Osage	700
Pilot Butte	20
Quealy dome	710
Rex Lake	10
Rock River	2,910
Spindletop	20
Poison Spider	260
Teapot	20
Warm Springs	140
Wertz	1,580
Total Wyoming	50,740
MONTANA	
Border	150
Cat Creek	540
Cut Bank	8,230
Dry Creek	500
Kevin-Sunburst	3,490
Lake Basin	20
Pondera	450
Total Montana	13,380
COLORADO	
Florence	180
Fort Collins and Wellington	290
Wilson Creek	310
Iles dome	2,080
Moffat	320
Orchard	20
Rangely	20
Tow Creek	120
Price	330
Total Colorado	3,670
NEW MEXICO	
Cooper	4,530
Eaves	870
West Eunice	110
Eunice	24,640
Hardy	3,310
Hobbs	13,110
Jal	930
Langlie	5,260
Lynch	550
Lynn	860
Mattix	4,020
Monument	25,390
North Lynch	40
Penrose	6,060
Rhoades	130
Skaggs	100
Skelly	2,110
South Eunice	3,590
So. Lovington	160
Vacuum	8,710
Artesia-Maljamar	9,090
Getty	100
Hogback	200
Rattlesnake	580
Table Mesa	70
Total New Mexico	114,520
Total Rocky Mountain region	182,310

Personal Paragraphs

ALBERT SLINGLUFF has been made assistant to the district manager of Pure Oil Co. with headquarters in Wheeling, W. Va. The Wheeling district comprises eight counties in Ohio and West Virginia.

HOWARD BOYD, since 1934 chief scout for the Magnolia Petroleum Co., Dallas, Tex., was transferred last week to Wichita, Kans., where he will assume duties with the company's land department. W. P. DUNCAN, JR., formerly scout in the Lea County, New Mexico, area, has been promoted to the chief scout position vacated by Mr. Boyd. The vacancy left in New Mexico is to be filled by B. A. MOSS, of Refugio, formerly with the Union Producing Co.

ROBERT MONTGOMERY, of the Bunte Oil & Gas Co., Houston, Tex., left last week for a vacation trip in Florida.

CHESTER H. THURM, manager of the export division of Pennzoil Co., Inc., returned to New York March 28 after a visit to South America.

L. G. CAMERON, geologist, formerly associated with the Deep Rock Oil Corp., has moved to Shreveport, La., where he joined the Midstates Oil Corp.

JOSEPH GLASS, New York, president of the Midstates Oil Corp., made a tour of inspection of the company's holdings in the Gulf Coast district the past week.

J. E. MEINTVER, of the Texas Co., with offices in Easton, Md., is spending a vacation in California and will visit the world's fair in San Francisco before returning home.

A. S. GULSTON, of Mexico City, has accepted a position with Trinidad Leaseholds Co. and has been assigned to duty at Caracas, Venezuela. Mr. Gulston had been connected with Compania Mexicana de Petroleo El Aguila, S.A., in Mexico for 17 years previous to the expropriation.

ALBERT FINSTON, formerly vice president and general manager of the Bell Oil & Gas Co., and his nephew, ARTHUR J. FINSTON, who was active in various departments of that organization, have formed Finston & Co., with offices in Tulsa, "to engage in the exploration for and the acquisition of petroleum and natural gas producing properties."

L. GORDON CAMPBELL, manager of the lubricating bulk sales department of the Standard Oil Co. of Indiana in Chicago, on April 1 will join Moore & Munger, New York, brokers of petroleum waxes, and producers and marketers of clays for use in various industries.

JUDGE AMOS L. BEATY, New York attorney and operator, has been renamed chairman of the Independent Petroleum Association of America's committee on elimination of illegal production. JOHN E. KILGORE, Wichita Falls, Tex., is vice chairman. The other members are WILLIAM D. P. CAREY, Hutchinson, Kans.; W. P. McGINNIS, Indian Territory Illuminating Oil Co., Bartlesville, Okla.; JEFF DAVIS, chief counsel, Lion Oil Refining Co., El Dorado, Ark., and C. H. LYONS, Lyons & Prentiss, Shreveport, La.

W. E. LEROUX, production superintendent of the European Gas & Electric Co., in Nagykanizsa, Hungary, has sent news of the birth March 8 of Stephen Anthony Leroux. Mr. Leroux is a son of E. H. LEROUX, Tulsa, retired president of the Oklahoma Pipe Line Co.

E. G. DAHLGREN, oil and gas conservation director of the Kansas Corporation Commission during the last two years, announced his resignation last week, effective April 1. He has served the past month as technical adviser to THEO A. MORGAN, appointed conservation director by GOVERNOR PAYNE H. RATNER. Mr. Dahlgren said he had no definite plans for the future. It is understood that JOHN P. ROBERTS, assistant managing director of the Kansas Independent Oil and Gas Association, will be named assistant conservation director by Mr. Morgan.

BALDWIN M. WOODS, of Berkeley, Calif., regional chairman of a consulting board appointed by the National Resources Committee, was the main speaker at a meeting conducted in El Paso, Tex., last week by federal and state representatives for the consideration of natural resource conservation in Texas and New Mexico. Problems under consideration included surface and underground water supplies, conservation and consumption of water, sources of salinity and its control, flood and erosion control, siltation, and adjustments concerning land use and mineral resources.

Do You Remember?

From The Oil and Gas Journal Files

25 YEARS AGO

Tulsa has eight banks with combined deposits of $10,050,000 and a population estimated at 41,000, or about 125 per cent more than four years ago.

Capt. Peter Grace, veteran and highly regarded oil producer in various eastern fields, dies in Robinson, Ill. With George H. Dimmick he drilled the famous 646 well in the Cherry Grove, Pennsylvania, field in the early eighties.

Benjamin F. Brundred, 60, of Oil City, Pa., one of the owners of the Eclipse Oil Co., dies at his home.

The abandonment of two deep tests in Orange County, Texas, causes Gulf Coast operators to fear that deep drilling is a hopeless expense. The two wells were not abandoned until they had reached a depth of 3,000 feet.

The deep well in the Bradford field in Pennsylvania has been abandoned at 5,830 feet.

20 YEARS AGO

Thomas A. O'Donnell, California oil executive, is elected the first president of the American Petroleum Institute.

Bill Davis, a Dana & Adams lease foreman, was on top of a 72-foot derrick in the Bradford field when a heavy wind blew it down. Mr. Davis was catapulted ahead of the wreckage, landed on the ground, got up and shook himself, and returned to work.

10 YEARS AGO

Oil men who are attempting to revolutionize the business by doing away with waste and bringing about conservation seem to be widely apart on definitions for the words waste and conservation.

Twenty representative petroleum stocks on the New York exchanges average $58.57 per share for the week ending March 30.

W. C. LEWIS, of Houston, Tex., has been appointed assistant manager of the land and drilling department of the Bennett Oil Corp.

R. F. SCHEIG, independent operator of San Antonio, Tex., has gone to Alabama to take part in the new oil activity in that state. He spent several days in Shreveport, La., on the way.

ART CARMODY, of Shreveport, La., manager of the North Central Texas Oil Co., Inc., spent last week in New York, attending the company's annual meeting and visiting friends and business acquaintances.

GEORGE D. HARRIS, geologist with the Midstates Oil Corp., has been placed in charge of the company's new office in Lafayette, La. He was transferred from the Shreveport office.

B. A. TRAMMELL, for the past five years clerk in the Gulf Oil Corp. office in Amarillo, Tex., is leaving April 1 to go into the construction business with his father, M. O. TRAMMELL, in Fort Worth, Tex. He has been an employe of the Gulf for the past 11 years.

N. C. McGOWEN, of Shreveport, La., president of the Union Producing Co., presided at a conference of officials of Union Producing and three affiliated companies in Munroe, La., last week. Taking part in the conference were H. L. DICKERSON, of New York, and M. A. ABERNATHY, W. J. QUIGGLES, B. M. NOWERY, R. H. HARGROVE, A. D. GREENE and S. L. DAVIS, of Houston, Tex.

T. G. Shaw, Fort Worth, Tex., independent operator, who has three important wildcat tests drilling in West Texas, has left for a vacation in California.

E. R. TURNER, of Houston, Tex., manager for the past three and a half years for Pan-American Production Co., has been elected vice president of that company and also of Pan-American Pipe Line Co.

HERBERT W. MACK is on the way to Venezuela, where he will become chief pipe line dispatcher for the Mene Grande Oil Co. Mr. Mack has been in the Mexican Gulf Oil Co. service in Mexico for 19 years, chiefly in the transportation and production divisions.

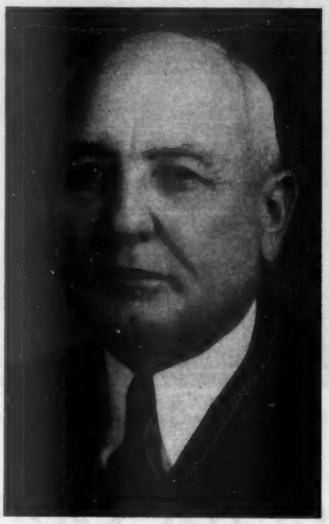
FRANCIS JOHN HOPWOOD, of London, England, one of the territory managers in the Royal Dutch-Shell executive department, spent part of last week in New York. Accompanied by Mrs. Hopwood, he sailed from New York March 24 aboard the Santa Rosa en route to Caracas, Venezuela.

H. M. MOSHER, chairman of the board; S. B. MOSHER, president; O. W. MARCH, vice president in charge of marketing, and R. H. GREEN, vice president in charge of production, of the Signal Oil & Gas Co., were reelected to their respective offices at the annual meeting of the company last week.

PROF. JOEL HENRY HILDEBRAND, of the University of California, received the William H. Nichols Gold Medal of the New York section of the American Chemical Society at a recent joint dinner of the section and the Society of Chemical Industry in the Hotel Pennsylvania, New York. The award was in recognition of outstanding achievement in physical chemistry.

Had More Fun in Oil

L. B. Simmons, new president of the Western Petroleum Refiners Association, was assistant general freight agent of the Fort Worth & Denver City Railway Co. in Fort Worth, Tex., in 1918. He had advanced from a modest position with the organization, and he regarded himself as well started on a career as a railroad man. Then came the Burkburnett oil boom, with its infectious excitement, and he fell victim. (N. B. He's glad he did, for he has had more fun than if he had dedicated his talents to the rather humdrum occupation of supervising transportation of miscellaneous freight from here to there.) He resigned his post, hurried to Wichita Falls and engaged in the race for underground riches. He didn't find the millions that had seemed possible, but he did find himself in a field that more nearly met his idea of a satisfying life than railroading had.



L. B. SIMMONS

Mr. Simmons became interested in a small skimming plant in the nearby K.M.A. field and eventually decided to devote his major attention to the refining branch of the oil industry. He moved to Duncan, Okla., in 1921 and organized the Rock Island Refining Co. Its small skimming plant has grown to a 6,500-bbl. skimming and cracking refinery. At no time since then have all the fires been pulled at any one time and Mr. Simmons admits he's proud of that record. He is president of the Rock Island Refining Co., Rock Island Oil Co., Duncan Oil Co., and Rocket Oil Co.

D. W. HARRIS, vice president of the Arkansas Oil Co., is spending several days in Washington, D. C.

R. B. STANDEFER and K. F. DANIEL, of the Shell Oil Co., with offices in Dallas, Tex., are in California on a trip in connection with exploration activities in that state.

E. F. ESTERGREN, former Fort Worth, Tex., consulting geologist, who moved to Dallas, Tex., several years ago, has taken offices in Fort Worth and plans to move to that city.

KENNETH KRAEMUS and JACK KNIGHT, Superior Oil Co. of California geologists, have been assigned to duty in New Zealand, where the company has several thousand acres of holdings.

ALBERT H. HINKLE, of Louisville, Ky., has been appointed district engineer in Cincinnati, Ohio, for the Asphalt Institute, which has its headquarters in New York, and has as its membership 32 producers of asphalt, including most of the large oil companies. He succeeds MAJ. W. R. MACATEE, who has been promoted to the management of the Washington office. Mr. Hinkle's district includes Ohio, Kentucky, Indiana, Michigan, and West Virginia.

ROBERT H. McELROY, in the service of the Pure Oil Co. 14 years, has been made assistant to the vice president in charge of sales, with headquarters in the general offices in Chicago. CHARLES W. SNIDER becomes operations manager in the marketing division, with headquarters in Chicago. GEORGE C. MORRIS is transferred from Chicago to Beaumont, Tex., to assume charge of pipe lines, crude oil purchasing and retail distribution activities in Texas and Louisiana.

SHIFTS: PAUL M. TUCKER, geophysicist Carter Oil Co., from Hiawatha, Kans., to Beloit, Kans.; F. L. LIVELY, superintendent Humble Oil & Refining Co., from Port Sulphur, La., to Genoa, Tex.; A. J. CUNNINGHAM, manager Standard Oil Co. of Texas, from Dallas, Tex., to Houston, Tex.; O. C. HOWELL, drilling contractor, from Overton, Tex., to Kenedy, Tex.; KEITH A. SPITZNAGEL, geologist, from Centralia, Ill., to Evansville, Ind.; J. W. CAVANAGH, drilling contractor, from Centralia, Ill., to Evansville, Ind.; W. D. HECK, JR., engineer Ethyl Gasoline Corp., from Chicago to Billings, Mont.; LOWELL L. SPARLING, president Southern Illinois Petroleum Corp., from Olney, Ill., to Fairfield, Ill.; D. T. MILLER, superintendent Black, Sivalls & Bryson, Inc., from St. Elmo, Ill., to Clay City,, Ill.; SIDNEY DAVIS, JR., Zephyr Drilling Co., from Salem, Ill., to Mount Vernon, Ill.; R. M. SWESNIK, geologist, from Vandalia, Ill., to Chicago; G. G. JAUCHIUS, superintendent Pure Oil Co., from Mount Pleasant, Mich., to Temple, Mich.; C. H. GREGORY, Shell Oil Co., from Bakersfield, Calif., to Bogota, Colombia; W. R. RANSONE, from Caracas Petroleum Corp., Caracas, Venezuela, to Geophysical Service, Inc., Dallas, Tex.; CARL ORRISON, superintendent Bay Petroleum Corp., from Denver, Colo., to McPherson, Kans.; J. V. SCHAFGES, drilling contractor, from Garnett, Kans., to Colony, Kans.; RONALD R. RANSOM, scout Skelly Oil Co., from Shawnee, Okla., to Evansville, Ind.

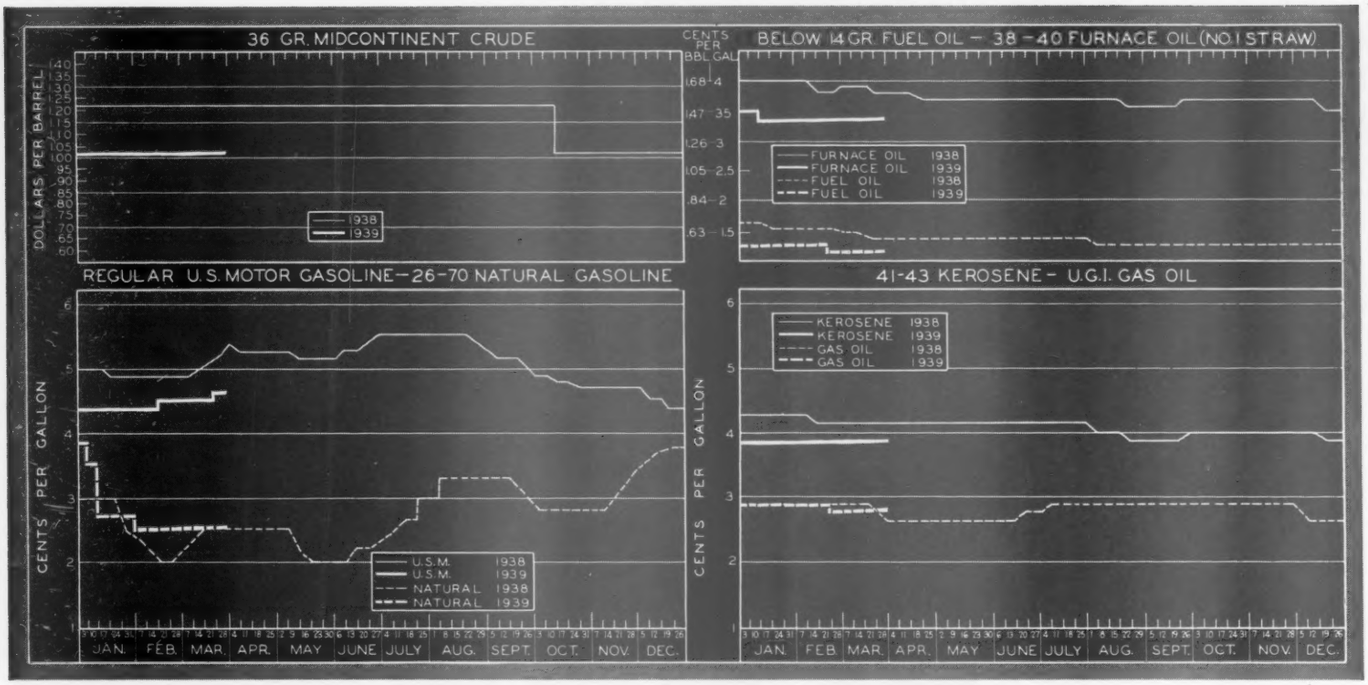
WALTER S. HALLANAN, president of the Plymouth Oil Co., declared in his annual report to stockholders that the oil industry must correct demoralized conditions promptly if it is to remain free from complete government regulation. "Our house can be set in order and it is not too much to believe that the day is not far distant when that objective can be realized."

C. O. RISON, field superintendent for Indian Territory Illuminating Oil Co., Bartlesville, Okla., has been made general chairman of the spring meeting of the Mid-Continent district of the American Petroleum Institute's Division of Production, to be held April 18 and 19 in the Skirvin Hotel, Oklahoma City, Okla. Mr. Rison has appointed the following chairmen: T. J. HAMILTON, Phillips Petroleum Co., Oklahoma City, program; M. W. BIRMINGHAM, Indian Territory Illuminating Oil Co., Oklahoma City, publicity and registration; H. R. GOODPASTER, Kerlyn Oil Co., Oklahoma City, entertainment.

FRANK NEDEN, in charge of plant operations of the British American Oil Co. refinery at Coutts, Alberta, for the past year, has been transferred to Moose Jaw, Saskatchewan.

GEORGE A. HILL, JR., was reelected president of the Houston Oil Co. at the annual meeting in Houston, Tex., last week. Other officers were renamed as follows: L. S. ZIMMERMAN, vice president and treasurer; A. H. KENNERLY, secretary-auditor; ROBERT R. HOBSON, general manager; GEORGE B. PELTON and H. W. FAIRBROTHER, assistant secretaries; GEORGE D. SEARS, general counsel.

E. J. WEBSTER, division manager in charge of operations in Kansas City, Mo., for the Phillips Petroleum Co., will be moved to the Bartlesville, Okla., office April 1 as assistant to A. M. HUGHES, vice president in charge of sales. D. M. McBRIDE, division manager in Omaha, Neb., will move to the Bartlesville office as director of sales research. LEO BARRY, assistant to the division manager in Kansas City, will be division manager, succeeding Mr. Webster. F. O. NORDSTROM, assistant manager of the Omaha division, will succeed Mr. McBride as division manager in Omaha.



Representative Mid-Continent Quotations on Crude Oil and Refined Products, Basis Oklahoma (Group 3)

Improving Prospect for Gasoline Stirs Better Feeling in Group 3 Market

By T. F. SMILEY

There was no mistaking the cheerier feeling among Group 3 refiners this week. It emerged primarily from the brightening prospects for gasoline, along with an advance in the tankcar prices of that product. But other divisions were contributing to the livelier spirits too. Light distillates, for instance, instead of crumbling, as expected, were exhibiting freshened activity. One sales manager, long distinguished for his steadfast refusal to join the hat-tossers and insisting on tangible evidence as a basis for market opinions, rather surprised his friends by conceding there was "real ground for encouragement."

Gasoline Buying Active

Buying by jobbers, and also by refiners who regard their own stocks as inadequate to meet probable demand, has been brisk in the past week. Higher prices were foreseen, and thrifty purchasers started building up their supplies. This was not the sole motive though, for retailers were drawing heavily on jobber stocks. One large jobber in midwestern territory who obtains his gasoline from Oklahoma refiners reported that his business had doubled in the past 30 days. His experience is understood to be fairly typical. Some jobbers, after giving their weekly orders, wired for rush shipments of additional material.

Although the addition to the nation's stocks of gasoline in the week ending March 18 was 941,000 bbls., compared with 9,000 in the corresponding week of 1938, nervousness over this factor in the market continues to diminish. There is a growing belief that with two world fairs in operation, the present year will witness the heaviest cross-country motor traffic in history. In effect, refiners appear to be betting that whatever unhealthy elements there may be in the market at this juncture will be eradicated by a smashing tourist business during the approaching summer. The more conservative ones still insist that refinery operations are excessive and that there is danger of piling up more gasoline than even a record-breaking summer business can absorb.

The improvement in the outlook for light-gravity distillates afforded an interesting development of the week. Less than a month ago this group of products was a source of much uneasiness, for a mild winter had left formidable inventories in refinery tanks. A swing into tractor fuels seems to have saved many refiners from threatened losses. Range oil and No. 1 furnace oil, usually with addition of low-grade naphtha or of gasoline, provide a tractor fuel for which there is ready demand. For old-type tractors even this simple blending operation is not necessary. One large Oklahoma refiner reported he was sold up on light distillates and was buying.

The tractor fuels were moving in large volume and prices were stiffening. Quotations on 40- to 42-gravity material were definitely higher. Kerosene, though unchanged in price, was exhibiting a firmer tone.

Natural Gasoline Still Holding

Natural gasoline was slightly easier, though the quotations that have obtained in Oklahoma and Texas for the past six weeks had little difficulty in keeping their footing. There was no difficulty in getting material, but offerings were not of such size as to disturb price schedules.

Wax was riding high. Some refiners were not willing even to consider offers of 2.6 cents, the low of published prices for 124-126 white crude scale and were quoting 2.75 cents. A faintly better tone was reported in neutrals and bright stocks, ascribable to the seasonal rise in demand, but no real improvement in this division seems probable till some of the contracts made on an extremely low basis last November have expired. Substantial shipments were made in the past week.

Refined Oil Market Barometer

Gasoline gaining strength in interior areas, but soft on Pacific and Gulf coasts; lagging on East Coast, with reported concessions, though consumption is high. Active ordering expected as soon as buyers are confident prices are at their lows. Light burning oil inventories are being liquidated with less difficulty than expected. Wax extremely strong and supplies scarce.

MID-CONTINENT. Gasoline strong. Light-gravity fuels active. Tractor fuels rising.

EAST COAST. Gasoline soft, but feeling in trade cheerful. Light fuels weak.

GULF COAST. Gasoline weak. Fuel oils soft. General market dull. Prices unchanged.

PENNSYLVANIA. Gasoline lifeless. Lubricating oils holding. Wax strong.

CALIFORNIA. General market dormant, with tendency toward lower prices.

CHICAGO. Gasoline strong at higher prices. Heavy fuels gaining. Tractor fuels active.

Motor Fuel Markets in the East Running Counter to Demand

By H. STANLEY NORMAN

NEW YORK, Mar. 28.—For the second consecutive week motor fuel markets in the northeastern part of the country moved counter-current to the upward trend of consumption. The tankcar gasoline market was on fairly firm ground, although reports were heard that high-octane motor fuel was moving in the New York Harbor barge trade at concession figures, but 5⅝ cents per gallon was the lowest price and the range was upward to 5⅞, 6 and even 6⅛ cents per gallon.

New York City tank-wagon motor fuel prices were lowered a half cent per gallon by Socony-Vacuum Oil Co., Inc., on March 22. The same company cut a cent from the tank-wagon price and a quarter of a cent from the consumer tankcar price at Rochester on March 21 and lowered the dealer tank-wagon quotation seven-tenths of a cent per gallon at Burlington, Vt., March 17.

Scale wax continued its upward market movement last week and prices at New York and New Orleans were advanced by most suppliers about one-tenth of a cent per pound. The export demand has been particularly brisk for the past few weeks and was again strong last week. Several suppliers are sold ahead on their producing capacity for as much as two months and are unable to quote in the current market. There is a disinclination on the part of refiners to quote ahead of May.

Conditions in the Gulf Coast market were mostly unchanged last week. The market was firm to strong for industrial grades of fuel oil, but the lighter burning oils were suffering from slack demand and the quotations eased off slightly. Bunker C grade fuel oil was held at a minimum of 67½ cents per barrel in the Gulf Coast cargo market to resellers and some suppliers were asking up to 72½ cents for their industrial burning oils. The top of the market range is now an even 10 cents per barrel higher than the low existing during the early part of February.

Gas oil with relatively high Diesel index was offered on the Gulf Coast by some suppliers for 3¼ cents per gallon to the export trade. For domestic coastwise movement No. 2 fuel oil was available for 3⅛ to 3¼ cents, but two small cargoes of gas oil were sold on the Gulf at 3⅜ cents.

Reports on condition of the Gulf Coast motor fuel market were difficult to analyze. Some quarters reported that the current market is reasonably firm and that suppliers are unwilling to shade quotations even for the prospect of sizeable sales. From one or two sources, however, the Gulf Coast market was said to be soft and that firm bids at prices fractionally lower than currently quoted would attract supplies. In view of the consumption volume currently reported from practically all sections of the country, particularly in the northeastern and far western territories, it seems logical that refiners are willing to hold their present stocks rather than accept business at concession prices. Several refiners supplying the northeastern trade centering around New York report that motor fuel demand is up approximately 10 per cent from the first quarter of 1938. With consumption due to take a sustained upward trend in April, reaching its peak in July and August, refiners are inclined to view prospects with optimism.

Kerosene was offered freely in the New York tankcar market at 4½ cents per gallon and even this price could be bettered on firm bid in a few directions. Gulf Coast refiners are generally quoting 3¾ to 4 cents per gallon. There have been no recent changes in the tank-wagon market for kerosene in this district. General reductions of a half to a full cent per gallon were made in the kerosene tank-wagon market during the latter part of February and the first of March.

The continued increase in stocks of motor fuel is one factor functioning to defer buying, according to close observers of market conditions. Most large buyers are still purchasing on a hand-to-mouth basis but are watching developments carefully to get their volume orders into the market before prices make any substantial advance. A wave of buying is expected to sweep the primary markets with the first indication that absolute bottom has been reached. This wave may be touched off with the first halt of gasoline inventory increases or if the current rate of consumption improves sufficiently to start the expected advance of Gulf Coast quotations. At this particular season the motor fuel market is considered highly sensitive to what otherwise might be minor influences. The tanker charter market was practically unchanged last week. Clean boats were available for the Gulf to north of Hatteras run at 15 to 16 cents per barrel and most of the dirty vessels fixed during the past two weeks have been at 17 cents per barrel for the same trip. Two tankers were chartered last week for April loading at Curacao and north of Hatteras delivery for 17 cents per barrel. The boats were chartered for movement of two cargoes of heavy fuel oil, reflecting to some extent the condition of the domestic market for industrial burning oils.

Stocks of scale wax are scarce and material for nearby delivery is difficult to locate despite another advance in the market to a range of 2.6 to 2.65 cents per pound, for both the 122-124 and 124-126 a.m.p. grades. Practically all suppliers have discontinued quotations on future delivery indicating that further advances may be in prospect. Domestic consumers are ordering out material at better than normal volume, but the big increase has been for export in comparison to 1938. The recent advances in Pennsylvania crude quotations have acted to spur the higher wax prices.

Northeastern market observers registered keen interest in the Texas Railroad Commission's abandonment of Saturday production holiday starting in April. Although summer demand will tend to cushion the impact of 6,750,000 bbls. of current crude production next month and in subsequent periods, the impression exists here that the Saturday shut-down abandonment is Texas' bid for a greater portion of the petroleum market. Texas producers and state officials have voiced dissatisfaction on frequent recent occasions over the steady sacrifice of markets to other areas in which no production regulation exists.

In view of the Texas development the official opposition from Acting Gov. Stelle of Illinois, made in a letter to the Petroleum Association of Illinois, takes on added significance.

In the opposition to any type of regulatory legislation in Illinois and Texas' bid for a greater portion of the crude market, eastern observers see the possibility of an early showdown. The possibility of a conflict for crude markets is believed here to be exercising an indirect depressing influence on refined products. At least the crude situation is serving to keep potential buyers of refined products on the sidelines.

A. P. I. Weekly Refinery Statistics

Week Ending March 25, 1939

	Capacity reporting (per cent)	Daily crude runs (bbls.)	Total gasoline stocks	Gas oil and fuel oil stocks
East Coast	100.0	496,000	21,617,000	6,993,000
Appalachian	85.9	110,000	3,427,000	727,000
Indiana, Illinois, and Kentucky	89.5	458,000	15,700,000	5,117,000
Oklahoma, Kansas, and Missouri	81.6	252,000	7,935,000	3,909,000
Inland Texas	50.3	96,000	1,938,000	1,817,000
Texas Gulf	89.5	767,000	10,863,000	7,153,000
Louisiana Gulf	97.3	136,000	2,573,000	1,357,000
North Louisiana and Arkansas	55.0	45,000	497,000	761,000
Rocky Mountains	54.2	46,000	1,897,000	741,000
California	90.0	473,000	15,914,000	97,533,000
Total reported	85.8	2,879,000	82,361,000	126,108,000
Estimated unreported	.....	346,000	5,200,000	2,930,000
*Estimated total	.....	3,225,000	87,561,000	129,038,000
*Estimated total previous week	.....	3,250,000	87,291,000	130,371,000
*March 26, 1938	.....	3,093,000	92,312,000	121,741,000

*Bureau of Mines, currently estimated.

Stocks of Crude Oil in the United States

(BUREAU OF MINES ESTIMATES)

Week ending March 18, 1939	273,345,000 barrels
Week ending February 11, 1939	272,852,000 barrels
Week ending March 19, 1938	306,380,000 barrels

Figures do not include stocks of heavy, unrefinable California crude.

Retail Oil Markets

Tank-wagon and filling station prices on gasoline and kerosene furnished by the larger marketing firms

Prices as of March 28, 1939

Taxes

The gasoline quotations given in the following tables include the 1-cent federal tax, as well as state, county, and city taxes. The gasoline is the regular or standard grade. In most areas lower grades and a premium grade also are available.

Standard Oil Co. (Indiana)

	Gasoline Tank-wag.	Gasoline Dlr.	Gasoline Inc. tax	Kero. tank-wag.
Chicago, Ill.	15.1	12.1	4.0	10.0
Decatur	15.1	12.6	4.0	10.0
Joliet	15.1	12.6	4.0	10.0
Peoria	15.1	13.1	4.0	10.0
Quincy	14.9	12.9	4.0	8.7
Davenport, Ia.	15.1	13.6	4.0	‡10.0
Des Moines	14.9	13.4	4.0	‡9.8
Mason City	15.3	13.8	4.0	‡10.2
Duluth, Minn.	16.9	15.4	5.0	10.8
Mankato	16.5	15.0	5.0	9.4
Minneapolis	16.5	15.0	5.0	10.4
LaCrosse, Wis.	16.5	15.0	5.0	10.4
Green Bay	16.9	15.0	5.0	10.3
Milwaukee	14.9	13.4	5.0	10.2
Detroit, Mich.	13.1	11.6	4.0	7.1
Grand Rapids	14.0	12.5	4.0	9.7
Saginaw	15.8	14.3	4.0	9.3
Evansville, Ind.	16.6	15.1	5.0	†10.5
Indianapolis	16.8	15.3	5.0	†10.0
South Bend	17.1	15.6	5.0	†9.0
Fargo, N. D.	16.7	15.2	4.0	11.6
Huron, S. D.	17.0	15.5	5.0	10.9
Kans. City, Mo.*	14.4	12.4	4.0	8.0
St. Louis*	14.2	12.7	4.0	8.0
St. Joseph	14.4	12.0	4.0	9.3
Wichita, Kans.	13.9	11.1	4.0	7.8

*State tax 2 cents, 1-cent city tax and 1-cent federal tax. †Does not include 4-cent state tax. ‡Does not include 3-cent state tax.

Exclusive of state general sales taxes.

Discounts to commercial consumers: On purchases per month off tank-wagon prices: 1,000 gallons or more, 1.5 cents off; minimum delivery 25 gallons.

Stanolex Fuel Oil in Chicago

Effective February 15, 1939, f.o.b. Chicago tank-wagon prices: Standard range oil, 1-99 gallons, 9 cents; 100-149 gallons, 8 cents; 150 gallons and over, 7.5 cents. Stanolex fuel oil No. 1, 1-149 gallons, 8.25 cents; 150-399 gallons, 7.25 cents; 400 gallons and over, 6.75 cents. Stanolex furnace oil, 1-149 gallons, 8.25 cents; 150-399 gallons, 7.25 cents; 400 gallons and over, 6.75 cents. Stanolex Grade A, 1-399 gallons, 5 cents; 400 gallons and over, 4 cents. Stanolex Grade B, 1-799 gallons, 4.75 cents; 800 gallons and over, 3.75 cents.

Ohio

STANDARD OIL CO. OF OHIO

	Gasoline Tank-wag. con'r.	Gasoline Dlvided dlr.	Gasoline Inc. tax	Kero. tank-wag.
Ohio points	16.0	15.0	5.0	*13.0

*Includes state tax of 1 cent.

Southern District

STANDARD OIL CO. (KENTUCKY)

	Gasoline Cons'r tank-wag.	Gasoline Net dlr.	Gasoline Inc. tax	Kero. tank-wag.
Atlanta, Ga.	18.5	15.5	7.0	8.5
Augusta	19.5	16.5	7.0	9.0
Macon	19.0	16.0	7.0	10.0
Savannah	17.5	14.5	7.0	8.0
Birmingham, Ala.	20.0	17.0	8.0	8.5
Mobile	21.0	18.0	9.0	8.5
Montgomery	21.0	19.0	9.0	10.5
Jackson, Miss.	17.5	14.5	7.0	9.5
Vicksburg	19.0	16.0	7.0	9.0
Jacksonville, Fla.	19.0	16.0	8.0	8.0
Miami	19.0	16.0	8.0	8.0
Pensacola	20.0	17.0	9.0	8.0
Tampa	19.0	16.0	8.0	8.0
Lexington, Ky.	19.0	16.0	6.0	10.0
Covington	17.5	14.5	6.0	9.5
Louisville	17.5	14.5	6.0	9.0
Paducah	18.5	15.5	6.0	9.0

Price basis to tank-wagon consumers: Effective January 4, 1937; 3 cents per gallon below tank-wagon price. Effective June 4, 1938, 2 cents per gallon discount eliminated from all kerosene markets in Mississippi, Alabama, Georgia, and Florida, markets being reduced correspondingly to a net basis.

Montgomery, Ala., has a county tax of 1 cent per gallon, and a city tax of 1 cent per gallon on gasoline, in addition to state tax and 1 cent per gallon on kerosene. Mobile, Ala., has a city gasoline tax of 2 cents per gallon; Birmingham, Ala., has a city gasoline tax of 1 cent per gallon; Pensacola, Fla., has a city gasoline tax of 1 cent.

Atlantic Coast District

STANDARD OIL CO. OF NEW JERSEY

	Gasoline Cons. tank-car	Gasoline Dlr. tank-wag.	Gasoline Inc. tax	Kero. tank-wag.
Atl'tic City, N. J.	10.9	12.7	4.0	7.0
Newark	10.9	12.7	4.0	7.0
Annapolis, Md.	12.85	14.35	5.0	9.5
Baltimore	12.25	13.75	5.0	7.0
Cumberland	13.65	16.15	5.0	10.0
Wash'gton, D. C.	10.50	12.0	3.0	9.5
Danville, Va.	14.45	16.95	6.0	12.9
Norfolk	13.25	15.75	6.0	11.5
Petersburg	13.55	16.05	6.0	11.7
Richmond	13.55	16.05	6.0	8.7
Roanoke	14.75	17.25	6.0	11.0
Charles'n, W. Va.	14.05	16.55	6.0	12.6
Parkersburg	13.35	14.85	6.0	11.2
Wheeling	14.35	15.75	6.0	12.2
Charlotte, N. C.	15.65	18.15	7.0	12.1
Hickory	16.15	18.65	7.0	12.5
Mt. Airy	15.95	18.45	7.0	12.3
Raleigh	15.25	17.75	7.0	11.6
Salisbury	15.75	18.25	7.0	12.2
Charleston, S. C.	14.25	16.75	7.0	10.6
Columbia	15.25	17.75	7.0	11.6
Spartanburg	15.95	18.45	7.0	12.4

Price basis to Essolene undivided dealers: Dealer tank-wagon price less .5 cent per gallon. Price basis to commercial consumers, effective March 8, 1937, in Maryland, District of Columbia, and in Arlington and Fairfax counties in Virginia; and March 12 in New Jersey: To contract accounts purchasing at least one full compartment at time by hose connection, on yearly purchases: From 2,500 to 100,000 gallons, consumer tank-wagon price at time and place of delivery; 100,000 gallons per year, consumer tankcar price plus .5 cent per gallon. Consumer tank-wagon price generally will be equivalent to dealer tank-wagon price less .5 cent per gallon.

Effective January 16, 1939, in North Carolina the commercial consumer schedule became as follows: Single deliveries of 50 gallons or more, consumer tank-wagon price. Single deliveries of less than 50 gallons, 4 cents per gallon over consumer tank-wagon price. Generally the posted consumer tank-wagon price will be equivalent to the dealer price, less .5 cent per gallon. The above policy also applies in South Carolina effective January 23, 1939.

Discounts for kerosene, 1 cent off tank-wagon price for 25 gallons or more under contract (contract not necessary in Baltimore) except no discount in New Jersey.

Pacific Coast Territory

STANDARD OIL CO. OF CALIFORNIA

	Gasoline Tank-wag.	Gasoline Serv. sta.	Gasoline Inc. tax	Kero. tank-wag.
San Francisco	17.5	18.5	4.0	11.5
Los Angeles	17.0	18.0	4.0	10.0
Fresno, Calif.	18.5	19.5	4.0	12.5
Phoenix, Ariz.	21.5	22.5	6.0	*17.5
Reno, Nev.	20.5	21.5	5.0	13.5
Portland, Ore.	20.0	21.0	6.0	13.5
Seattle, Wash.	20.0	21.0	6.0	13.5
Spokane	23.0	24.0	6.0	16.5
Tacoma	20.0	21.0	6.0	13.5

*Includes 5-cent state tax.

Discounts to dealers: On gasoline, off tank-wagon price, to 100 per cent dealers, 3 cents. To commercial consumers: On tank-wagon price; on single deliveries of 40 gallons and over, advance quantity discount extended at time of delivery, 3 cents. Service station schedule applies on single deliveries less than 40 gallons. On kerosene in tankcar, transport truck and trailer delivery, 3 cents off tank-wagon price; plant deliveries to jobbers, 2.5 cents below tank-wagon.

March 18, 1939, split dealer discount was canceled.

Pennsylvania, Delaware, and Part of New England

ATLANTIC REFINING CO.

	Gasoline Cons. tank-car	Gasoline Dlr. tank-wag.	Gasoline Inc. tax	Kero. tank-wag.
Philadelphia, Pa.	12.0	13.0	5.0	10.0
Pittsburgh	13.0	15.0	5.0	10.5
Allentown	12.75	14.25	5.0	10.5
Erie	13.0	14.5	5.0	10.0
Scranton	13.0	14.5	5.0	10.5
Altoona	13.0	15.0	5.0	10.5
Dover, Del.	...	13.5	5.0	10.5
Wilmington	...	12.5	5.0	9.75

Price basis to undivided dealers, dealer tank-wagon price less .5 cent per gallon. Price basis to commercial consumers in Pennsylvania and Delaware, effective March 11, 1937: Consumers under contract using 100,000 gallons or more per year full compartment hose deliveries, tankcar plus .5 cent. Consumers under contract using less than 100,000 gallons per year compartment hose deliveries, undivided dealer price. Consumers under contract less than full compartment delivery, consumers not under contract, consumers not under contract full compartment delivery, divided dealer price. Less than 25 gallons, tank-wagon delivery, 4 cents per gallon above undivided dealer price.

New York and New England

SOCONY-VACUUM OIL CO., INC.

	Gasoline Cons. tank-car	Gasoline Dlr. tank-wag.	Gasoline Inc. tax	Kero. tank-wag.
Albany	11.5	13.8	5.0	7.5
*Met. N. Y.:				
Manhat., Bronx	11.5	12.4	5.0	7.5
Queens, Br'klyn	11.5	12.4	5.0	7.5
Staten Island	11.5	12.9	5.0	7.5
Buffalo	12.0	11.8	5.0	7.0
Rochester	12.25	12.5	5.0	8.0
Syracuse	12.0	14.0	5.0	7.5
Boston, Mass.	10.25	12.0	4.0	6.75
Portland, Me.	11.5	13.5	5.0	7.0
Manchester, N.H.	12.1	14.1	5.0	7.5
Burlington, Vt.	12.0	13.5	5.0	7.5
Springfield, Mass.	10.75	12.8	4.0	7.25
Worcester	10.75	12.8	4.0	7.25
Hartford, Conn.	10.75	12.8	4.0	7.00
New Haven	10.75	11.5	4.0	6.00
Providence, R. I.	10.25	12.3	4.0	7.00

*Does not include 2 per cent city sales tax which is calculated on basis of net retail price exclusive of state and federal taxes. Metropolitan New York prices are undivided dealer prices; others are split dealer.

Price basis to undivided dealer: Posted dealer tank-wagon price less .5 cent. Price basis to commercial consumer: Effective Nov. 15, 1936, monthly purchases of 25,000 gallons and over, consumer tankcar prices at delivery point plus .5 cent per gallon; monthly purchases of 5,000 to 25,000 gallons, undivided dealer price at delivery point; monthly purchases under 5,000 gallons, pay divided dealer tank-wagon prices at delivery point.

Rocky Mountain District

CONTINENTAL OIL CO.

	Gasoline Dealer	Gasoline Inc. tax	Kero. tank-wag.
Denver, Colo.	15.5	5.0	11.5
Grand Junction	18.0	5.0	15.0
Pueblo	14.0	5.0	10.5
Casper, Wyo.	17.0	5.0	11.5
Cheyenne	16.0	5.0	13.0
Billings, Mont.	18.0	6.0	13.0
Butte	19.5	6.0	15.5
Great Falls	18.0	6.0	15.5
Helena	19.0	6.0	15.5
Salt Lake City, Utah	16.0	5.0	16.0
Boise, Idaho	†19.1	6.0	18.0
Twin Falls	†19.6	6.0	18.0
Albuquerque, N. M.	16.0	*6.5	10.0

*Includes city tax of .5 cent. †Includes state tax of 1 mill.

Central South District

STANDARD OIL CO. OF LOUISIANA

	Gasoline Cons. tank-car	Gasoline Dlr. tank-wag.	Gasoline Inc. tax	Kero. tank-wag.
New Orleans, La.	16.75	19.25	*10.0	‡11.0
Baton Rouge	14.75	17.25	8.0	‡10.5
Alexandria	14.75	17.25	8.0	‡12.5
Lafayette	15.00	17.50	8.0	‡12.5
Lake Charles	14.75	17.25	8.0	‡12.5
Shreveport	13.50	16.00	8.0	‡11.0
Knoxville, Tenn.	18.00	20.50	8.0	14.5
Memphis	16.00	18.50	8.0	12.5
Chattanooga	17.50	19.00	8.0	14.0
Nashville	17.00	17.50	8.0	12.0
Bristol	18.25	17.0	8.0	14.5

Essolene at dealer price less .5 cent per gallon to undivided dealers.

*Includes 2-cent parish tax. †Includes 1-cent parish tax and 1-cent state tax. ‡Includes 1-cent state tax.

Price basis to commercial consumers: Effective May 15, 1937, deliveries of 50 gallons or more in one territory take posted consumer tank-wagon price. Accounts taking deliveries of less than 50 gallons at one time pay posted consumer tank-wagon price plus 4 cents per gallon. Generally, the posted consumer tank-wagon price will be equivalent to the dealer price less .5 cent per gallon. Kerosene prices include 1-cent state tax.

Effective February 24, 1939, the company reestablished in New Orleans the commercial consumer policy on motor fuel effective in the rest of the state.

Effective December 12, 1938, the company revised its commercial consumer policy on motor fuel in New Orleans, as follows: Single deliveries of less than 50 gallons, consumer tankcar plus 2 cents per gallon; 50 to 199 gallons, consumer tankcar plus 1 cent per gallon; 200 gallons and over, consumer tankcar plus .5 cent per gallon.

Nebraska

STANDARD OIL CO. OF NEBRASKA

	Gasoline Tank-wag.	Gasoline Dlr.	Gasoline Inc. tax	Kero. tank-wag.
Omaha	17.5	15.0	6.0	10.3
McCook	18.0	16.0	6.0	10.5
Norfolk	17.9	15.4	6.0	10.7
North Platte	18.3	15.9	6.0	11.1
Scottsbluff	17.6	15.5	6.0	11.7

Discounts to commercial consumers for tank-wagon deliveries covered only by standard commercial consumers contract, effective January 1, 1935.

Oklahoma and Arkansas

CONTINENTAL OIL CO.

	Gasoline Dealer	Gasoline Inc. tax	Kero. tank-wag.
Texarkana, Ark.	12.0	5.0	8.0
Fort Smith	13.25	5.0	7.5
Little Rock	16.75	7.5	8.0
Muskogee, Okla.	13.0	5.0	7.9
Oklahoma City	11.0	5.0	6.5
Tulsa	11.0	5.0	6.5

Texas

	Gasoline Tank-wag.	Gasoline Serv. sta.	Gasoline Inc. tax	Kero. tank-wag.
Dallas, Tex.	11.0	15.0	5.0	7.0
Fort Worth	11.0	15.0	5.0	8.0
Houston	13.0	17.0	5.0	8.0
San Antonio	14.0	18.0	5.0	8.0

Naphtha

STANDARD OIL CO. (INDIANA)

	Tank-wagon*
Oleum spirits	15.7
V.M.&P. naphtha	16.0
Cleaners' naphtha	15.0
Stanisol	15.0

*Prices include 3-cent Illinois tax but not 1-cent federal tax or 2 per cent retail occupational tax.

Prices f.o.b. Chicago. Each price subject to discount of 1 cent per gallon for 150-gallon lots if covered by contract.

Canada*

3-Star Imperial Gasoline
IMPERIAL OIL, LTD.

	Tank-wag.	Inc. tax	Kero. tank-wag.
Halifax, N. S.	23.5	10.0	17.5
St. John, N. B.	23.5	10.0	17.5
Montreal, Que.	20.0	6.0	14.5
Toronto, Ont.	21.0	6.0	15.5
Hamilton, Ont.	21.0	6.0	15.5
Winnipeg, Man.	26.5	7.0	20.5
Brandon, Man.	28.0	7.0	22.9
Regina, Sask.	26.0	7.0	22.0
Saskatoon, Sask.	28.3	7.0	24.9
Edmonton, Alta.	26.5	7.0	21.5
Calgary, Alta.	23.5	7.0	19.0
Vancouver, B. C.	23.0	7.0	23.0

*Imperial gallon used in Canada.

Divided dealers pay tank-wagon prices. Discount to undivided dealers, 1 cent below tank-wagon price. In maritime provinces both divided and undivided dealers pay tank-wagon price.

Tank-Wagon Changes

Standard Oil Co. (Indiana) March 16 advanced tank-wagon and dealer gasoline .5 cent in Minneapolis; advanced dealer gasoline and tank-wagon kerosene .5 cent in Kansas City and Wichita; advanced tank-wagon kerosene .5 cent in Mankato; March 18, advanced dealer gasoline .8 cent in St. Joseph.

Standard Oil Co. of New Jersey March 8 reduced tank-wagon kerosene .5 cent in Baltimore (correction).

Continental Oil Co. March 17 advanced dealer gasoline 2 cents in Grand Junction, 1 cent in Pueblo, and 1 cent in Cheyenne.

Standard Oil Co. (Nebraska) March 23 advanced dealer gasoline .5 cent in Omaha, McCook, Norfolk, and North Platte, and .6 cent in Scottsbluff; advanced tank-wagon gasoline .5 cent in McCook and .6 cent in Scottsbluff; advanced tank-wagon kerosene .5 cent in McCook and Scottsbluff and .1 cent in North Platte.

Standard Oil Co. of Louisiana March

(Continued on Page 234)

Prices of Refined Products

All quotations f.o.b. plant in cars for interstate or export movement except as otherwise noted

Prices as of March 28, 1939

The following quotations are exclusive of the federal excise taxes of 1 cent a gallon on gasoline and 4 cents a gallon on lubricating oils.

Refinery Gasoline

OKLAHOMA (Group 3)—

U. S. Motor grades:		
62 octane and below	.03¾	.03⅞
63-66 octane	.04⅛	.04¼
67-69 octane	.04⅜	.04½
70-72 octane (regular)	.04⅝	.04¾
60-62 400 grades:		
62 octane and below	.03⅜	.03⅞
63-66 octane	.04⅛	.04¼
67-69 octane	.04⅜	.04⅝
70-72 octane (regular)	.04⅝	.04¾
64-66 375	.04	.04⅛
68-70 360	.05	.05⅛

NORTH TEXAS—

U. S. Motor grades:		
62 octane and below	.03¾	.03⅞
63-66 octane	.04⅛	.04¼
67-69 octane	.04⅜	.04½
70-72 octane (regular)	.04⅝	.04¾
60-62 400	.03¾	.03⅞
64-66 375	.04	.04⅛

NORTH LOUISIANA (Ark. and N. La. delivery)—

U. S. Motor grades:		
62 octane and below	.04¼	.04⅜
63-66 octane	.04½	.04⅝
67-69 octane	.04¾	.04⅞
70-72 octane (regular)	.05⅛	.05¼

ARKANSAS (Ark. and N. La. del.)—

U. S. Motor grades:		
62 octane and below		.04
67-69 octane	.04½	.04⅝

CHICAGO (Based on Group 3)—

U. S. Motor grades:		
62 octane and below		.03⅞
63-66 octane	.04¼	.04¼
67-69 octane	.04⅜	.04½
70-72 octane	.04⅝	.04¾
60-62 400 grades:		
62 octane and below		.03⅞
63-66 octane	.04⅛	.04¼
67-69 octane	.04⅜	.04½
70-72 octane	.04⅝	.04¾
64-66 375	.04	.04¼
68-70 360	.05	.05⅛

PENNSYLVANIA (Inland refineries)—

58-60 U. S. Motor:		
Below 60 octane	.04¼	.04⅜
65 octane		.06¼
68-70 octane		.06½

CALIFORNIA (domestic movement)—

54-58 U. S. Motor	.06	.08
58-60 400, 65 oct. and higher	.07½	.09

EAST COAST (domestic)—

U. S. Motor, 65 and above:		
*New York (Bayonne)	.06	.06¼
Philadelphia	.06	.06¼
Baltimore	.06	.06¼
Charleston, S. C.	.06½	.06⅝

*All grades of gasoline one-eighth to one-fourth cent less for barge shipments. New York Harbor prices are for New York and New England delivery. Prices for New Jersey delivery one-fourth cent lower.

GULF COAST (domestic)—

U. S. Motor grades:		
Below 60 octane		.04¾
60-64.9	.04½	.04⅝
65 octane and higher		.04⅝
68-70	.04⅞	.05⅛

Naphtha

PENNSYLVANIA (Inland refineries)—

52-56 450 (blending)	.04¼	.04½

Natural Gasoline

OKLAHOMA (Group 3)—

Grade 26-70		.02½
Grade 18-55		.03

NORTH TEXAS—

Grade 26-70	.02⅝	.02½
Grade 18-55	.02¾	.02⅞

CALIFORNIA—

75-85 375-390	.06½	.07

NORTH LOUISIANA (Ark. and N. La. delivery)—

Grade 26-70		.02¾

Tractor Fuel

OKLAHOMA (Group 3)—

40-42 gr., 315-325 i.b.p., 110-flash, 540-550 e.p.	.03⅞	.04
41-43 gr., 300-320 i.b.p., 110-125 flash, 500-520 e.p.	.04	.04¼
46-48 gr., 210-230 i.b.p., 480-max., e.p.	.04⅝	.04⅝

Kerosene

(All kerosene water white)

OKLAHOMA (Group 3)—

41-43	.03⅞	.04
42-44	.04⅛	.04¼

NORTH TEXAS—

41-43	.04	.04⅛

NORTH LOUISIANA (Ark. and N. La. delivery)—

41-43	.04	.04⅝

ARKANSAS (Ark. and N. La. del.)—

41-43		.04½

PENNSYLVANIA (Inland refineries)—

45	.05	.05½
46	.05¼	.05¼
47	.05¼	.05⅝

CHICAGO (Based on Group 3)—

41-43	.03⅞	.04⅛
42-44	.04⅛	.04⅝

CALIFORNIA (Pac. Coast market)—

38-43 high burning test	.04¾	.05¾

NEW YORK (Bayonne, N. J.)—

41-43		.04½

***GULF COAST (domestic)—**

41-43	.03⅞	.04⅛

*Barge price one-eighth cent lower.

Furnace Oil

OKLAHOMA (Group 3)—

Range oil	.03¾	.03⅞
No. 1 prime white, 38-42	.03⅝	.03¾
No. 1 straw, 38-40	.03⅝	.03½
No. 2 straw, 32-36	.03¼	.03⅜
No. 2 dark, 32-36	.03⅛	.03¼
No. 3 zero to 15, 28-32	.03	.03¼
No. 3, 15 and above, 28-32	.02¾	.02⅞

NORTH TEXAS—

No. 1 prime white, 38-42	.03⅝	.03¾
No. 1 straw, 38-40	.03⅜	.03½

NORTH LOUISIANA (Ark. and N. La. delivery)—

No. 2, 32-36	.03⅜	.03⅝

ARKANSAS (Ark. and N. La. del.)—

No. 2, 32-36		.03⅝

CHICAGO (Based on Group 3)—

Range oil	.03¾	.03⅞
No. 1 prime white, 38-40	.03⅝	.03¾
No. 1 straw, 38-40	.03⅜	.03½
No. 2 straw, 32-36	.03¼	.03⅜
No. 2 dark, 32-36	.03⅛	.03¼
No. 3, zero to 15, 28-32	.03	.03⅛
No. 3, 15 and above, 28-32	.02¾	.02⅞

NEW YORK (Bayonne, N. J.)—

*No. 1	.04½	.04⅝
*No. 2		.04
*No. 4		.04

*Barge deliveries one-eighth to one-fourth cent under above tankcar price.

Gas Oil and Fuel Oil

(Gas oil per gal., fuel oil per bbl.)

OKLAHOMA (Group 3)—

U.G.I. gas oil	.02¾	.02⅞
No. 4, low pourpoint, 24-28	1.00	1.10
No. 4, 15 and above, 24-28	.85	.90
No. 5, low pourpoint, 18-22	.70	.75
Below 14 fuel oil, industrial	.45	.55

NORTH TEXAS—

U.G.I. gas oil	.02¾	.02⅞
No. 4, low pourpoint, 24-28	1.00	1.10
No. 5, low pourpoint, 18-22	.70	.75
Below 14 fuel oil, industrial	.45	.55

NORTH LOUISIANA (Ark. and N. La. delivery)—

10-14 fuel oil, industrial	.70	.75

CHICAGO (Based on Group 3)—

U.G.I. gas oil	.02⅝	.02⅞
No. 4, low pourpoint, 24-28	1.00	1.10
No. 4, 15 and above, 24-28	.85	.95
No. 5, low pourpoint, 18-22	.70	.80
No. 5, 15 and above, 18-22	.60	.70
No. 6, low pourpoint, 10-16	.60	.70
No. 6, 15 and above, 10-16	.35	.45

PENNSYLVANIA (Inland refineries)—

36-40	.04½	.04¾

CALIFORNIA—

Los Angeles:		
30-40 gas oil, per bbl.	1.15	1.35
24 plus Diesel, per bbl.	1.00	1.30
24 plus Diesel (bunkers)	1.15	1.50
12-16 (bunkers at tidewater)	.75	.90
10-16 (cargo lots)	.60	.80
12-17 (tankcars)	.50	.80
10-17 (high sulfur)	.45	.70
San Joaquin Valley:		
10-18 (tankcars)	.50	.80
24 plus Diesel, per bbl.	1.15	1.40
San Francisco:		
24 plus Diesel, per bbl.	1.40	1.45
24 plus Diesel (bunkers)	1.45	1.55
10-16 (bunkers)	.90	.95

GULF COAST—

No. 2 fuel	.03⅝	.03⅝
43-47 Diesel	.03½	.03⅝
48-52 Diesel	.03½	.03⅝
53-57 Diesel	.03⅝	.03¾
Bunker C (bulk cargoes)	.67½	.70
Bunker C (bunkers)		.75

NEW YORK (Bayonne, N. J.)—

27 plus, gas oil		.04
28-30 Diesel (lighterage 6¼c per bbl.)		1.65
28-30 Diesel (tankcars)	.04¼	.04½
Bunker C (to ocean-going ships in N. Y. Harbor)		.95
Industrial fuel (tankcars)		.03¼

Lighterage charge 5c bbl. additional.

Bright and Steam Refined

OKLAHOMA (Group 3)—

190-200 D, 15-25		.19
150-160 D, 0-10	.14¼	.16
150-160 D, 15-25	.13½	.15½
150-160 E, 15-25	.13	.15
100-110 D, 0-10		.14½
Steam refined:		
631 green (treated)		.12½
600 dark green (untreated)	.04½	.05

PENNSYLVANIA—

Bright Stocks (Pennsylvania Grade No. 8 color, 140-150 at 210, 545-550 flash):		
10 pourpoint	.17½	.18½
15 pourpoint	.16½	.17½
25 pourpoint	.15	.15½
Steam refined:		
600	.08½	.10
650	.10½	.11
600 flash	.11	.12
630 flash	.13½	.14

Neutral Oil

(Vis. at 100° F. except Pennsylvania and color N.G.A.)

OKLAHOMA (Group 3)—

150-3		.09
180-3		.10
180-4		.09½
200-3		.10½
200-4		.10
250-3		.11½
250-4		.11
280-3		.12½
280-4		.12
300-6½		.13
400-3½		.14
100-2½ paraffin oil		.06
15-20 pourpoint:		
200-3		.10
200-4		.09½
250-3		.11
250-4		.10½
280-3		.12
280-4		.12½

GULF COAST—

Pale oils:		
200-3	.07	.07¼
300-3	.07½	.07¾
500-3½	.08½	.08¾
750-3½	.08⅝	.09⅛
1,200-3½	.09½	.09¾
1,500-4	.09¾	.10
Red oils:		
200-5-6	.07¼	.07½
300-5-6	.07¼	.07½
500-5-6	.08	.08½
750	.08¾	.09
1,200-5-6	.09¼	.09½

CALIFORNIA (moving to dom. market)—

Pale oils:		
100-2½-3	.07¼	.08
200-2½-3	.07¼	.08
300-2½-3	.07¼	.08
400-3-4	.07¼	.08
450-3-4	.07¼	.08
550-3-4	.09	.11
600-3-4	.09	.11
Red oils:		
200-4-5	.07¼	.08
300-5-6	.07¼	.08
350-5-6	.09¼	.11½
400-5-6	.09¼	.11½
450-5-6	.09¼	.11½
500-5-6	.09¼	.11½
600-5-6½	.09¼	.11½
700-6½ plus	.09¼	.11½
750-6½ plus	.09¼	.11½
900-6½ plus	.09¼	.11½

PENNSYLVANIA—

150 vis. at 70° F., 3 color, 400-405 flash:		
Zero pourpoint	.17½	.18
10 pourpoint	.17	.17½
15 pourpoint	.15½	.16
25 pourpoint	.14	.14½
200 vis. at 70° F., 3 color:		
Zero pourpoint	.18½	.19½
10 pourpoint	.18	.18½
15 pourpoint	.17½	.18
25 pourpoint	.16	.16½

Wax and Petrolatum

(Prices per pound)

OKLAHOMA (Group 3)—

124-126 (a.m.p.) w.c. scale	.0260	.0272

PENNSYLVANIA (Inland refineries)—

122-124 (a.m.p.) w.c. scale	.0255	.0260
124-126 (a.m.p.) w.c. scale	.0260	.0265

NEW YORK—

Wax in bags fully refined:		
122-125 (a.m.p.) wax		.0350
125-127 (a.m.p.) wax		.0360
128-130 (a.m.p.) wax		.0375
130-132 (a.m.p.) wax		.0435
133-135 (a.m.p.) wax		.0465
135-137 (a.m.p.) wax		.0490
124-126 (a.m.p.) w.s.	.0255	.0260
124-126 (a.m.p.) y.s.	.0250	.0255
Petrolatum in barrels, carload lots:		
Dark green	.02	.02¼
Amber	.02⅜	.02½
Extra amber	.02⅝	.02¾
Lily white	.05½	.05¾
Snow white	.06½	.06¾
Cream	.04⅛	.04¼

Export Prices

GASOLINE

GULF COAST—

U. S. Motor	.04¼	.04¾
60-62 400	.04¾	.04⅞
61-63 390	.04⅝	.04⅞
64-66 375	.04½	.04⅝

LOS ANGELES—

U. S. Motor grades:		
55-65 octane	.04½	.04¾
65-69 octane	.04¾	.05
Above 69 octane	.05	.05½

KEROSENE

GULF COAST—

41-43 prime white	.03⅞	.04⅛
41-43 water white	.03⅞	.04¼

LOS ANGELES—

41-43 water white	.05	.05¼

LUBRICANTS

(Pennsylvania Grade)

NEW YORK (f.a.s. in bbls.)—

Cylinder stocks:		
600 Warren E	.15	.15½
600 S.R. unfiltered	.16	.16½
630 S.R. unfiltered	.17	.17½
600 flash, S.R.	.17	.17½
630 flash, S.R.	.20½	.21
Bright stocks:		
8 color	.16¼	.16½

NEUTRAL OIL

200-3 color	.21½	.22
150-3 color	.19½	.20

PARAFFIN WAX

NEW YORK (prices per pound)—

123-125 a.m.p.		.0375
125-127 a.m.p.		.0387
128-130 a.m.p.		.0412
133-135 a.m.p.		.0437
135-137 a.m.p.		.0455
Crude scale:		
124-126 w.s.	.0255	.0260
124-126 y.s.	.0255	.0260

Crude Oil Prices

Oklahoma, Kansas, North Central and East Central Texas

East Texas (Oct. 11, 1938)* $1.10
Van, Tex. (Oct. 11, 1938)* ..... .93
Talco, Tex. (Oct. 11, 1938)* ..... .55
Rodessa, Tex. .....
See North Louisiana gravity schedule
Cass and Panola counties, Texas .....See gravity schedule
Altus and Tipton† .....See note below
Cayuga, Tex. (Feb. 15, 1939) ..... .68
Clay Creek, Tex. ..... .85

*Humble Oil & Refining Co. †Gulf Refining Co. Pure Oil Co.'s Van price, 93 cents, effective Oct. 13, 1938.

Altus and Tipton, Okla., starting at below 25 degrees at 71 cents, 2-cent spread to 40 degrees and above at $1.03. East Texas price met by all buyers posting prices. Talco price adopted by Talco Pipe Line on October 11. Cayuga posted by Pan American Pipe Line Co. Clay Creek posted by Sun Oil Co.

Southwest Texas

Salt Flat, Darst Creek, Hilbig, Carroll, Clark and Zoboroski (Oct. 11, 1938)* ..... $ .96
Pettus (Oct. 11, 1938)* 1.29
Flour Bluff (Dec. 3, 1938)* 1.23
Darst Creek (Oct. 12, 1938)† ..... .96
Darst Creek and Bruner (Oct. 13, 1938)‡ ..... .96
Luling (Oct. 12, 1938)† ..... .87
Lytton Springs (Oct. 12, 1938)† ..... .99
Mirando (Oct. 12, 1938)† .....
Government Wells (Oct. 13, 1938) .....See note below

*Humble Oil & Refining Co. †Magnolia Petroleum Co. Pettus price adopted by Atlantic Crude Oil Purchasing Co. ‡Gulf Refining Co.

Government Wells posted by Sun Oil Co. starts at 20 gravity, 77 cents, 3-cent spread to 24-24.9 at 89 cents.

Gulf Coast

Conroe, Tex. (Oct. 11, 1938)* $1.27
Black Bayou and White Castle, La. (Oct. 11, 1938)† .....See note below
Gibson, La. (Oct. 11, 1938)† 1.04
Garden Island, La. (Oct. 12, 1938‡ 1.24
Lafitte, La. (Oct. 12, 1938)‡ 1.04
Cleveland, Tex. (Oct. 12, 1938)¶ 1.14
Schwab, Polk County (Feb. 20, 1939) 1.00
Hardin, Tex. (Oct. 12, 1938)¶ 1.02
Tepetate, La. (Oct. 11, 1938§ 1.03
Villa Platte, La. (Oct. 11, 1938)§ ... 1.03
Abbeville, La. (Jan. 1, 1939)§ .....
.....See note below
Bosco, La. (Dec. 3, 1938)‖ ..... .93
Creole, La. (Oct. 13, 1938)‖ ..... .96
Gueydan, Sweet Lake, and Louise, La. (Oct. 13, 1938)‖ ...See note below
Vinton, Edgerly, Starks, Hackberry, Timbalier Bay, Quarantine Bay, and Grand Bay, La. (Oct. 13, 1938)** .....
Long Lake, Tex. (Oct. 13, 1938** 1.08
Segno and Wing (Oct. 13, 1938)** .....See note below
Livingston (Oct. 11, 1938)† 1.10
Gibson, La. (Oct. 11, 1938)† 1.04

*Humble Oil & Refining Co. †Shell Petroleum Corp. ‡Texas Co. §Continental Oil Co. ¶Magnolia Petroleum Co. ‖Pure Oil Co. **Gulf Refining Co.

Black Bayou, etc., starts at below 20 degrees at 79 cents; 20-20.9, 81 cents; 21-21.9, 83 cents, then a 3-cent spread to 26-26.9 degrees, 98 cents, and 27 degrees and over $1. Abbeville starts at below 36 degrees, 92 cents, 2-cent spread to 40 degrees and over at $1.02. Gueydan, etc., starts at below 20 degrees, 79 cents, 3-cent spread to 26-26.9 degrees at $1, and 2-cent spread to 40 degrees and over at $1.28. Segno and Wing take Gulf Refining Co.'s Gulf Coast prices. Vinton, Edgerly, etc., schedule starts at below 18 gravity, 76 cents, 2-cent spread to 20-20.9 at 82 cents; then a 3-cent spread to 26-26.9 at $1; then a 2-cent spread to 34 degrees and over at $1.16. Schwab posted by Shell Petroleum Corp.

North Louisiana and Arkansas

Shreveport, La. (Mar. 25, 1939) ..$1.01
Shreveport, La. (Mar. 25, 1939) ..1.01
Smackover, Ark. (Oct. 5, 1938)* ...$ .73
Buckner, Magnolia, and Village, Ark. (Oct. 5, 1938)* ....See note below
Schuler, Jones sand .....See note below
Tullos and Urania ..... .89
Cotton Valley, La. (distillate) (Dec. 23, 1938)* 1.20
Lisbon, La. (Sept. 19, 1938) .....See note below

*Smackover posted by Standard Oil Co. of Louisiana, October 5, 1938; by Magnolia Petroleum Co., October 12; by Gulf Refining Co., October 13; McMillan Refining Co. and Cross Refining Co. met price. Tullos and Urania posted by Hunt Oil Co. and Arkansas Fuel Oil Co.

Schuler Jones sand schedule starts at below 25 degrees, 66 cents, with 2-cent spread to 40 and over at 98 cents; by Lion Oil Refining Co. on October 5, 1938; Schuler light Morgan sand crude takes North Louisiana gravity scale along with El Dorado and Champagnolle; by Lion Oil Refining Co., October 5; Buckner, Magnolia, and Village schedules posted by Standard Oil Co. of Louisiana and Lion Oil Refining Co. on October 5; quote same prices as for Schuler Jones sand crude. Shreveport: $1 price by Caddo Crude Oil Purchasing Co.; 98-cent price by Atlas Oil Corp.

Middle Western States

OHIO OIL CO.
(Effective October 13, 1938)

Lima, Ohio ..... $ .90
Illinois old fields 1.05
Illinois basin 1.15
Princeton, Ind. 1.05
Western Kentucky (Oct. 13, 1938)† 1.10
Greendale, Porter, and Crystal, Mich. (Jan. 6, 1939)* ..... .92½
Buckeye, Bentley, Edenville, Beaverton, Mich. (Jan. 6, 1939)* ..... .90
Freeman-Redding, Mich, (Jan. 6, 1939)* ..... .82
West Branch and Arenac, Mich. (Dec. 13, 1938)* ..... .70
**Allegan-Kent (Mar. 15) ..... .68
Bloomingdale (Dec. 19) ..... .84
Muskegon 1.00
Sherman, Mich. (Dec. 13, 1938)‡ .. .82
Eastern Kentucky:
Big Sandy River† 1.12
Kentucky River† 1.20

*Simrall Corp. †Ashland Refining Co. ‡Pure Transportation Co. **Commonwealth Pipe Line Co.

Rocky Mountain States

Dry Creek, Wyo. (Oct. 11, 1938)* $ .92
Elk Basin, Wyo. (Oct. 11, 1938)*† .90
Grass Creek, light, Wyo. (Oct. 11, 1938)*† ..... .90
Grass Creek, heavy (Oct. 11, 1938)† .40
Lance Creek, Wyo. Oct. 11, 1938)* .77
Rock Creek, Wyo. (Oct. 11, 1938)*. 1.00
Iles, light, Colo. (Oct. 11, 1938)†... .98
Iles, heavy, Colo. (Oct. 11, 1938)†... .92
Dutton Creek, Wyo. (Oct. 11, 1938)† .....See note below
Frannie, light, Wyo. (Oct. 11, 1938)† .55
Frannie, heavy, Wyo. (Oct. 11, 1938)† ..... .42
Hamilton dome, Wyo. Oct. 11, 1938)† ..... .35
Midway, Wyo. (Oct. 11, 1938)† .....See note below
Salt Creek Tensleep crude, Wyo. (Oct. 11, 1938)† ..... .646
Salt Creek (Oct. 11, 1938) See note below
Canon City, Colo. (Oct. 11, 1938)‡. .90
Florence, Colo. (Oct. 11, 1938)‡.. .90
Cat Creek, Mont. (Oct. 11, 1938)‡.. 1.10
Big Muddy, Wyo. (Oct. 11, 1938)‡ .. .98
Lance Creek, Wyo. (Oct. 11, 1938)‡ .77
Lea County, N. M. .....See West Texas gravity schedule‡
Artesia, Jackson and Maljamar. .....See gravity table‡
Fort Collins and Wellington, Colo. .....See gravity table‡
Eddy County, N. M. (October 11, 1938)¶ ..... .77

*Ohio Oil Co. †Stanolind Oil & Gas Co. ‡Continental Oil Co. ¶Sinclair Prairie Oil Marketing Co.

Dutton Creek and Salt Creek Tensleep crude start at below 29 degrees, 86 cents, 2 cents spread to 40 and over at $1.10. Salt Creek crude excepting Tensleep takes Standard Oil Co. of Indiana, Oklahoma-Kansas prices. Stanolind Oil & Gas Co., effective October 11, discontinued posting prices in Greybull-Torchlight, Wyo., and Hogback and Hospah, N. M.

Eastern States

SOUTH PENN OIL CO.
(Effective March 6, 1939)

Pennsylvania Grade Oil in National Transit Lines (Bradford field) .$2.00
Pennsylvania Grade Oil in Southwest Pennsylvania Lines 1.65
Pennsylvania Grade Oil in Eureka Pipe Line lines 1.59
Pennsylvania Grade Oil in Buckeye Pipe Line lines 1.55
Corning Grade Oil in Buckeye Pipe Line Co. line (Jan. 24) 1.02

TIDE WATER ASSOCIATED OIL CO. and NEW YORK TRANSIT CO.
(Effective March 6, 1939)

Bradford, Pa. $2.00
Allegany, N. Y. 2.00

PENNZOIL CO.
(Effective March 6, 1939)

Group A $1.95
Group B 1.94
Group C 1.93
Group D 1.92
Group E 1.90

PURE OIL CO.
(Effective March 6, 1939)

West Virginia $1.59

West Texas

See gravity table.
Pecos County (Oct. 11, 1938)*....$ .78
Pecos shallow (Oct. 11, 1938)†.... .65

*Shell Petroleum Corp., Gulf Pipe Line Co. and Humble Oil & Refining Co. †Shell Petroleum Corp.

Canada

Ontario (Oct. 25, 1938)*
Petrolia $1.90
Oil Springs 1.97

TURNER VALLEY
(January 5, 1938, by Imperial Oil, Ltd.)
Clear naphtha and discolored naphtha, 65 gravity and higher....$2.14
Discolored naphtha and crude oil, 40-40.9 gravity 1.14
Increasing 2 cents for each degree gravity with top price for 64-64.9 gravity 1.62
These prices f.o.b. producers' field tankage.

*Imperial Oil, Ltd.

Crude Oil Price Changes

Sinclair Prairie Oil Marketing Co. revised its crude oil prices in West Texas and Lea County, New Mexico, effective March 24. Starting at 24-24.9 degrees at 63 cents, 2 cents is added for each degree up to and including 36 and above at 87 cents. The only change is that the old schedule continued the 2-cent differential up to and including 40 degrees and over at 95 cents.

Bell Oil & Gas Co., on April 1, will make effective an increase in the price it has been paying for crude oil in North Texas and the Red Riverbed area in Tillman County, Oklahoma. The new schedule will start at 28-28.9 degrees, 79 cents, with 2 cents added for each degree upward to 40 degrees and over at $1.03. The new prices will bring the Bell schedule up to within 7 cents per barrel of the major company postings in Oklahoma, and even with the major postings in North Texas, for the same grades.

Shell Petroleum Corp., effective February 20, posted a price of $1 per barrel for crude oil in the Schwab area, Polk County, Texas. It is the first posting for Wilcox sand (Tertiary) production which was opened in February and is paid on the basis of 100 per cent tank table measurements.

Effective March 25, Atlas Pipe Line Co. advanced its crude oil price in the Shreveport, La., field 3 cents, or to $1.01 per barrel. On the same day the Caddo Crude Oil Purchasing Co. advanced its price in the Shreveport field 1 cent, or to $1.01 per barrel.

Tank-Wagon Changes

(Continued from Page 232)

21 reduced dealer tank-wagon gasoline 2 cents in Nashville.

Socony-Vacuum Oil Co., Inc., March 22 reduced dealer tank-wagon gasoline in Manhattan, Bronx, Queens and Brooklyn .5 cent; March 21, reduced consumer tankcar gasoline .25 cent and dealer tank-wagon gasoline 1 cent in Rochester; March 17, reduced dealer tank-wagon gasoline .7 cent in Burlington; February 24, reduced tank-wagon kerosene .5 cent in Albany, metropolitan New York, Buffalo, Portland, and Manchester; on same date reduced tank-wagon kerosene .25 cent in Boston, Springfield and Worcester; on same date advanced tank-wagon kerosene .5 cent in Hartford and Rochester; on same date reduced tank-wagon kerosene 1.5 cents in Burlington.

Crude Prices by Gravities

	Oklahoma 1	Oklahoma and Kansas 2	North and Central Texas 3	Louisiana and Arkansas 4	East Central Texas 5	Gray County, Texas 6	Hutchinson and Carson counties, Texas 7	Raccoon Bend, Satsuma and Tomball, Texas 8	West Texas and Lea County, N. M. 9	Fort Collins and Wellington, Colo. 10	Anahuac and Dickinson, Mirando, Duval, Texas. 11	Refugio, Texas 12	Gulf Coast Texas 13	Cass and Panola counties, Texas 14	Beaumont and West Beaumont, Texas 15	Lockport, Iowa, Cameron Meadows, Louisiana 16	Artesia, Jackson and Maljamar, N. M. 17	Iowa, Louisiana 18
Below 18	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	$.74	....	$.75
18-18.9	....	....	....	....	....	....	....	....	.53	....	$.74	$.79	$.79	....	....	.76	....	.77
19-19.9	....	....	....	....	....	....	....	....	.53	....	.74	.79	.79	....	$.79	.78	....	.79
20-20.9	$.60	$.70	....	....	....	....	....	....	.55	....	.77	.82	.82	....	.82	.80	....	.81
21-21.9	.63	.72	....	....	....	....	....	....	.57	....	.80	.85	.85	....	.85	.82	....	.83
22-22.9	.66	.74	....	....	....	....	....	$.95	.59	....	.83	.88	.88	....	.88	.85	....	.86
23-23.9	.69	.76	....	....	$.78	....	....	.97	.61	....	.86	.91	.91	....	.91	.88	....	.89
24-24.9	.72	.78	$.71	....	.80	....	....	.99	.63	....	.89	.94	.94	....	.94	.91	....	.92
Below 25	....	....	....	$.73	....	....	....	....	....	....	....	....	....	$.73	....	....	....	....
25-25.9	.75	.80	.73	.75	.82	....	....	1.01	.65	....	.92	.97	.97	.75	.97	.94	....	.95
26-26.9	.78	.82	.75	.77	.84	....	....	1.03	.67	....	.95	1.00	1.00	.77	1.00	.97	....	.98
27-27.9	.81	.84	.77	.79	.86	....	....	1.05	.69	....	.97	1.02	1.02	.79	1.02	.99	....	1.00
28-28.9	.84	.86	.79	.81	.88	$.72	$.67	1.07	.71	$.81	.99	1.04	1.04	.81	1.04	1.01	$.61	1.02
29-29.9	.87	.88	.81	.83	.90	.74	.69	1.09	.73	.83	1.01	1.06	1.06	.83	1.06	1.03	.63	1.04
Below 30	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
30-30.9	.90	.90	.83	.85	.92	.76	.71	1.11	.75	.85	1.03	1.08	1.08	.85	1.08	1.05	.65	1.06
31-31.9	.92	.92	.85	.87	.94	.78	.73	1.13	.77	.87	1.05	1.10	1.10	.87	1.10	1.07	.67	1.08
32-32.9	.94	.94	.87	.89	.96	.80	.75	1.15	.79	.89	1.07	1.12	1.12	.89	1.12	1.09	.69	1.10
33-33.9	.96	.96	.89	.91	.98	.82	.77	1.17	.81	.91	1.09	1.14	1.14	.91	1.14	1.11	.71	1.12
34-34.9	.98	.98	.91	.93	1.00	.84	.79	1.19	.83	.93	1.11	1.16	1.16	.93	1.16	1.13	.73	1.14
Below 35	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
35-35.9	1.00	1.00	.93	.95	1.02	.86	.81	1.21	.85	.95	1.13	1.18	1.18	.95	1.18	....	.75	....
36-36.9	1.02	1.02	.95	.97	1.04	.88	.83	1.23	.87	.97	1.15	1.20	1.20	.97	1.20	....	.77	....
37-37.9	1.04	1.04	.97	.99	1.06	.90	.85	1.25	.89	.99	1.17	1.22	1.22	.99	1.22	....	.79	....
38-38.9	1.06	1.06	.99	1.01	1.08	.92	.87	1.27	.91	1.01	1.19	1.24	1.24	1.01	1.24	....	.81	....
39-39.9	1.08	1.08	1.01	1.03	1.10	.94	.89	1.29	.93	1.03	1.21	1.26	1.26	1.03	1.26	....	.83	....
40 and over	1.10	1.10	1.03	1.05	1.12	.96	.91	1.31	.95	1.05	1.23	1.28	1.28	1.05	1.28	....	.85	....

Market Record of Active Oil Stocks

Compiled by Carl H. Pforzheimer & Co., 25 Broad Street, New York City, Member New York Stock Exchange and New York Curb Exchange

New York Stock Exchange

1939 High	1939 Low	Week ending Mar. 25 High	Week ending Mar. 25 Low	Week ending Mar. 25 Close	Stocks—	Total shares outstanding	Par value	Latest dividend	Payable or last paid	Dividends paid in 1938	Com. sh. earn. 1937	Com. sh. earn. 1936	1938 High	1938 Low	1937 High	1937 Low
69½	60¼	63	60¼	60¼	Amerada Corp.	788,675	N.P.	50cQ	1-31-39	$2.00	$3.04	$2.52	78	55	111⅞	51½
23½	20½	21¼	20½	20¾	Atlantic Refining	2,663,999	$25	25cQ	3-15-39	1.00	3.51	2.59	27⅝	17⅝	37	18
21½	15⅛	16¾	15⅛	16¾	Barber Asphalt Co.	390,223	$10	75c	12-16-37	....	1.91	1.14	23¾	12⅛	43⅜	10⅛
19½	14⅜	16¼	15¼	15¾	Barnsdall Oil Co.	2,250,344	$5	25cQ	2-1-39	1.00	.85	1.01	21⅜	10⅛	35¼	10
9¼	8	8⅜	8	8¼	Consolidated Oil Corp.	13,915,167	N.P.	20cQ	5-15-39	.80	1.48	1.18	10⅜	7	17⅞	7
31½	26	28¾	26½	27	Continental Oil of Delaware	4,682,583	$5	25cQ	3-31-39	‖1.00	2.98	2.05	35⅝	21¼	49	24
8⅜	6½	7	6½	6¾	Houston Oil (new)	1,098,618	$25	....	10-17-30	....	.94	—.03	9¾	5	17⅝	4¾
16½	13⅝	15	14¼	14⅝	Mid-Continent Petroleum	1,857,912	$10	35c	12-1-38	.60	2.86	2.57	22⅝	12¼	35⅜	14
14⅞	12¼	12¾	12¾	12¾	Mission Corporation	1,382,945	$10	$1	6-29-38	1.00	1.31	.48	17¾	10⅝	34	15
15½	9⅝	10⅞	9⅝	10⅝	National Supply	1,155,170	$10	$2 pf.‡	12-22-37	....	4.90	2.02	23	12½	41⅜	17⅝
10¼	8	8⅝	8	8⅜	Ohio Oil Co.	6,563,377	N.P.	20c	12-15-38	.20	1.30	.70	14⅞	8⅞	22⅞	8
11⅞	10¼	10⅜	10¼	10⅜	Pacific Western Oil	1,000,000	N.P.	50c	12-20-38	.50	1.39	1.58	15⅞	10¼	29¾	11¾
6⅜	6¼	6	5¾	5¾	Pan American Pet. & Trans.	4,702,945	$5	$1*	12-21-37	....	1.18	.52	9¼	6¼	17⅛	7
43⅜	37⅛	39¼	37⅜	37⅝	Phillips Petroleum	4,449,052	N.P.	50cQ	3-1-39	‖2.00	5.42	4.02	44⅜	27¼	64	30⅛
22½	20	20¾	20	20⅝	Plymouth Oil Co.	1,029,800	$5	35cQ	3-31-39	1.40	2.85	1.65	25⅜	15	29⅞	13
11¼	8⅜	9⅜	8⅜	9	Pure Oil Co.	3,285,120	N.P.	25c	12-1-37	....	2.15	1.63	13½	8¼	24⅜	8¾
10¼	8¼	8⅞	8¼	8¾	Richfield Oil Corp.	3,896,638	N.P.	50c	12-21-38	.50	.35	....	9⅞	5	6½	4⅛
22⅜	17⅜	19½	17⅜	18¼	Seaboard Oil of Delaware	1,244,383	N.P.	25cQ	3-15-39	1.00	1.97	2.00	27½	15½	54⅛	16
15⅛	11⅜	13	12⅛	12½	Shell Union Oil	13,070,625	N.P.	35c	12-20-38	.70	1.44	1.57	18⅜	10	34¾	14⅞
29½	21	24½	23½	24¼	Skelly Oil	1,003,949	$15	50c	12-15-38	1.00	6.07	4.42	34¾	18½	60⅝	26½
13¾	12	12¾	12	12⅛	Socony-Vacuum	31,151,071	$15	25cSA	3-15-39	.50	1.82	1.38	16⅜	10¾	23¼	13
30⅛	26¾	28¾	27⅝	28½	Standard Oil of California	13,014,754	N.P.	30cQ†	3-15-39	1.40	3.17	1.79	34⅞	25⅛	50	27⅛
29⅛	26⅛	27⅛	26¼	26⅞	Standard Oil (Indiana)	15,267,030	$25	25cQ	3-15-39	1.00	3.66	3.09	35½	24¾	50	26½
50⅝	50¼	50⅜	50¼	50⅜	Standard Oil of Kansas	112,837	$10	$2	12-8-38	2.00	6.93	1.91	50¼	32½	43	30⅝
53¼	45⅞	48⅜	45⅞	48	Standard Oil of New Jersey	26,224,767	$25	50c§	12-15-38	§1.50	5.64	3.73	58⅜	39¾	76	42
66	55	60	60	60	Sun Oil	2,316,484	N.P.	25cQ	3-15-39	1.00	3.86	3.25	65½	45	77½	44½
3¼	2½	2⅝	2½	2⅝	Superior Oil Corp.	1,388,079	$1	10c	12-28-38	.10	.32	.14	4¼	1¾	7¾	1½
48¼	41	43	41	42⅜	Texas Corp.	10,875,006	$25	50cQ	4-1-39	2.00	5.02	4.10	49⅝	32⅝	65½	34¾
5⅜	4½	4⅞	4½	4⅝	Texas Gulf Producing Co.	888,142	N.P.	15c	12-15-38	.15	.68	.93	5⅞	2⅝	9⅝	2
10½	8¼	8⅞	8½	8⅝	Texas Pacific Coal & Oil	888,236	$10	10c	3-1-39	.40	1.11	.72	12½	7	16⅝	5⅜
14¼	12¼	13⅞	13½	13½	Tide Water Associated	6,369,175	$10	25cQ	3-1-39	1.00	2.08	1.03	15⅜	10⅛	21⅝	13⅛
19¾	18	19	18	18½	Union Oil of California	4,666,270	$25	30cQ	2-10-39	1.20	2.58	1.40	22½	17⅛	28¼	17½
23⅝	21	22¼	21	21	Union Tank Car Co.	1,200,000	N.P.	30cQ	3-1-39	1.30	1.70	1.76	23½	20	31½	22
3⅜	2⅞	3⅛	3	3⅛	Wilcox Oil & Gas	506,522	$5	....	5-10-28	....	.24	—.06	3½	1⅝	6¼	1⅜

*Payable in 3½ per cent notes. †Includes extras. ‡One-tenth share $2 preferred stock. §Also 1½ per cent stock dividend. ‖Also right to subscribe to bonds.

New York Curb Exchange

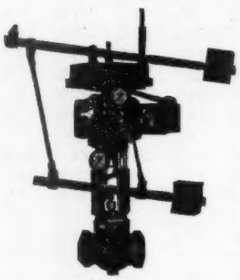
1939 High	1939 Low	Week ending Mar. 25 High	Week ending Mar. 25 Low	Week ending Mar. 25 Close	Stocks—	Total shares outstanding	Par value	Latest dividend	Payable or last paid	Dividends paid in 1938	Com. sh. earn. 1937	Com. sh. earn. 1936	1938 High	1938 Low	1937 High	1937 Low
9	7⅜	8⅛	7⅝	7¾	American Republics Corp.	1,308,049	$10	10c	7-11-38	$0.10	$0.27	$0.28	11¾	5	10	6⅝
7¼	4½	5⅛	4½	5⅛	Bridgeport Machine Co.	260,000	N.P.	$1.25	12-30-37	....	1.90	1.26	10¼	4⅞	21⅜	7
34¾	27¼	34¾	32	33	Buckeye Pipe Line Co.	200,000	$50	50c	3-15-39	2.00	4.02	4.40	39	22½	51½	36
130	121½	126	122½	122½	Chesebrough Mfg. Co.	120,000	$25	$1.50Q†	3-27-39	6.50	6.73	7.46	128	97	12	95½
9¼	6⅝	7¾	6¾	7¾	Cities Service (new)	3,714,317	$10	....	6-1-32	....	1.02	.13	11	5⅛	5⅜	1⅛
1⅛	¾	1⅛	¾	¾	Cosden Petroleum	462,551	$1	....	.....	....	.19	....	2⅜	⅞	5½	1½
23¾	19⅛	20	19⅜	19½	Creole Petroleum	6,975,383	$5	50cSA†	12-15-38	1.00	1.61	1.23	27½	17½	38¾	20¼
7⅛	6¼	6¼	6¼	6¼	Darby Petroleum	351,390	$5	25cSA	1-15-39	.50	1.36	1.26	10¼	5½	18⅝	6½
2¼	1⅝	2	2	2	Derby Oil & Refining	263,162	N.P.	....	.....	....	1.34	.66	3½	1½	8⅜	2¼
20	17½	17½	17½	17½	Eureka Pipe Line	50,000	$50	50c	2-1-39	3.00	—.12	—.62	31	16	47½	24½
40	35⅞	37¾	36	36⅛	Gulf Oil Corp.	9,076,202	$25	25cQ	4-1-39	1.00	3.51	2.90	46⅞	33	63½	33
69⅜	59½	61	59⅛	59¼	Humble Oil & Refining	8,987,840	N.P.	37½c	4-1-39	3.00	5.22	3.80	72⅝	56	87	54⅞
17	15⅞	16⅛	15⅞	16⅛	Imperial Oil of Canada	26,965,078	N.P.	62½cSA†‡	12-1-38	1.25	.98	.95	19½	14⅛	24¼	14½
7	6⅛	6⅜	6⅜	6⅜	Indiana Pipe Line	300,000	$10	30c	5-15-39	.50	1.03	1.00	9⅜	6	15	5⅜
27½	24¾	26	25½	26	International Petroleum	14,324,088	N.P.	$1.25†‡	12-1-38	2.50	....	1.81	31¼	21	39½	23½
3½	2⅝	2¾	2⅝	2⅝	Kirby Petroleum Co.	500,000	$1	10c	4-15-38	.10	.17	.20	5	2⅛	8¾	2⅜
20¼	17½	18⅞	18⅛	18⅜	Lion Oil Refining	434,820	N.P.	25cQ	4-20-39	1.00	2.17	1.43	25⅛	15⅝	34	12½
9½	8½	8¾	8½	8⅝	Lone Star Gas	5,553,747	N.P.	20c	4-20-39	.60	1.14	1.02	10⅜	6⅝	14¼	5¼
7¾	6¾	7⅛	6¾	6⅞	Louisiana Land & Exp.	2,977,449	N.P.	10cQ	3-15-39	.45	.58	.64	9⅜	6½	15¼	6¾
8⅜	8⅛	8½	8⅜	8½	Midwest Oil Co.	998,444	$10	50c	12-15-38	1.00	1.14	.95	9¾	6⅝	14⅝	6¼
5½	4⅞	5⅜	5⅛	5⅛	Mountain Producers	1,593,584	$10	30cSA	12-15-38	.60	.76	.62	5⅜	4½	7⅞	4⅛
13¼	12	12½	12⅛	12½	National Fuel Gas	3,810,183	N.P.	25cQ	4-15-39	1.00	.96	1.19	14⅝	11½	19½	12
8½	7½	8⅛	8	8	National Transit	509,000	$12.50	40c	12-15-38	.75	1.19	.79	9¼	6½	12½	7¼
1¾	1½	1½	1½	1½	New Mexico and Arizona	1,000,000	$1	1c	12-1-37	....	.02	.02	2⅜	1½	5	1⅛
8½	7¼	..	..	..	New York Transit	100,000	$5	15c	4-15-39	.25	.49	.34	4½	3½	5⅜	3⅞
5½	4½	5½	5⅜	5½	Northern Pipe Line	120,000	$10	15c	12-1-38	.35	.78	.66	6	4	12¾	5¾
7⅝	5½	5⅞	5½	5⅝	Pantepec Oil	2,441,142	$1	....	.....	....	....	.05	7¾	3½	9⅝	2¾
2¾	1⅞	2⅛	2	2	Root Petroleum Co.	336,045	$1	25c	2-1-37	....	—.17	.45	4½	1⅝	12¾	2
2⅜	1⅞	2⅜	2⅜	2⅜	Ryan Consolidated	296,931	N.P.	....	.....	....	.46	....	4	2⅛	6½	2¼
4	3½	4	4	4	Southern Pipe Line	100,000	$10	15cSA	3-1-39	.30	.85	.41	5⅜	3¼	7¼	3⅞
34⅞	31	33	31	33	South Penn Oil	1,000,000	$25	37½cQ	3-31-39	1.75	4.64	3.59	39	28¾	56	35
19	17	19	18½	18½	Southwest Penna. Pipe Lines	35,000	$50	50cQ	4-1-39	2.00	.95	.97	22¼	16½	42	20
18¾	17½	18⅛	17⅞	18	Standard Oil of Kentucky	2,604,790	$10	50cQ†	3-15-39	1.25	1.60	1.46	18¾	15	21⅛	14¾
6¾	6	6½	6½	6½	Standard Oil of Nebraska	166,403	$25	25c	3-29-37	....	—.58	.42	8¾	5½	13¾	8
21¼	19	20⅛	19½	19½	Standard Oil of Ohio	753,740	$25	25c	3-15-39	1.00	3.67	4.77	22¾	16¼	45	16
2⅝	2	2⅛	2	2	Sunray Oil	2,006,176	$1	5c	4-27-39	.05	.42	.26	3¼	2	4⅞	2
4	3	3½	3¼	3½	Texon Oil & Land	936,024	$2	15cQ	9-30-38	.60	.51	.36	5¼	3½	7⅝	2
5½	3⅞	3⅞	3⅞	3⅞	Transwestern Oil Co.	750,000	$10	....	.....	....	.48	.06	7⅝	4¼	13⅞	4⅝
3⅜	2½	2⅝	2½	2½	United Gas Corp.	7,818,959	$1	....	.....	....	.25	.20	5¼	2⅝	13⅞	3

†Includes extras. ‡Payable in Canadian funds. §Of which $1 was in preferred stock.

New or Improved Equipment

Steam Pressures in Gas-Fired Boilers Held to Close Limits

The Type V080A combustion regulator, introduced by Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., is designed to hold the steam pressure in a gas-fired boiler within close limits, and to control the air supply to the burner in conjunction with the gas resulting in high-combustion efficiencies. The regulator can be installed to fire automatically any radiant or blue-flame burner of the atmospheric type. Installation is simple as the entire control is mounted on the gas valve bonnet at a single point. A quarter-inch steam supply and exhaust line and connection to the electric service complete the installation.



High-pressure safety is one of the functions of the regulator. The convenient terminal panel, however, is arranged for easy incorporation of additional safety devices such as a Lo-Water cut-off, a Pilostat or a Protectoglo flame safeguard relay. Any interruption of the electrical safety circuit by one of the devices named will cause complete safety shutdown of the gas valve regardless of the demand on the regulator due to low steam pressure.

Here and There With Men Who Manufacture Equipment

The Bucyrus-Erie Co., builder of all sizes and types of excavating machinery, has arranged with the Gulf Tractor & Equipment Co., Houston, Tex., to represent it in that territory, handling the Bucyrus-Erie shovels, draglines and buckets, clamshell, lifting cranes and drag shovels.

Lon C. Hill, former resident of the lower Rio Grande Valley, was elected president of the Central Power & Light Co. at a meeting of the board of directors in Corpus Christi, Tex., succeeding James C. Kennedy, who is retiring.

H. A. Wienecke, Jr., sales engineer of the Gaso Pump & Burner Manufacturing Co., left Tulsa recently for the new development in Michigan to spend a week or 10 days in looking over the field.

American Sand-Banum Co., Inc., 9 Rockefeller Plaza, New York, has appointed L. H. Phillips Supply, P. O. Box 616, Tiffin, Ohio, as its representative in Ohio.

Dowell, Inc., oil and gas well chemical service, has opened a district office in the Shell Building, Houston, Tex., with C. T. Young district manager and S. C. Morian district engineer.

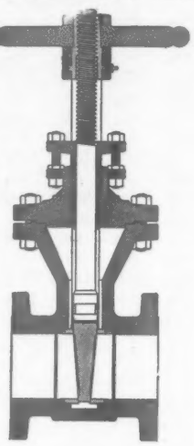
At the annual meeting of the American Mutual Liability Insurance Co. Col. W. F. Rockwell, president of the Pittsburgh Equitable Meter Co. and its subsidiary, the Merco Nordstrom Valve Co., was elected a director.

Tank Hazard to Be Demonstrated

During the meetings sponsored by the general safety committee at the Oil-World Exposition in Houston, Tex., April 24 to 29, inclusive, a demonstration, "Men Who Go Down to Their Death in Tanks," will be a feature. This demonstration, presented April 28, will be given by S. E. Whiting, vice president and chief engineer of the Liberty Mutual Insurance Co., Boston, Mass., assisted by volunteer victims with emergency equipment loaned by the manufacturers. Mr. Whiting will go from Boston to Houston for the express purpose of putting on the demonstration.

New Line of Drop-Forged Steel Valves Is Announced by Vogt

The Henry Vogt Machine Co., Tenth and Ormsby Streets, Louisville, Ky., has placed on the market a new line of 150-pound American standard drop-forged steel gate valves which, according to the manufacturer, embody important features. The body and the bonnet flanges are forged integrally. The bonnet flanges are of the round bolted type, and there is a full port opening through the valve. All valves in this new series have slotted gates and rolled-in seats. There is a gasket joint between the body of the valve and the bonnet.



These valves are made in 2-, 2½-, 3-, 4-, 6-, and 8-inch sizes, with stainless-steel trimmings regularly furnished. They are made to withstand working pressures of 150 pounds with temperatures to 500° F. and of 230 pounds for cold working pressures.

S. D. Jackson Back in Business

S. D. Jackson, manufacturers' agent for several lines of oil-field machinery, has opened an office in Marshall, Tex. Mr. Jackson and a brother formerly conducted the firm Jackson & Jackson in Shreveport, La. He represents Gardner-Denver Co., Allis Chalmers Manuacturing Co., Hercules and Le Roi gas and gasoline engines, and Taylor oil well and water well flowing equipment. All of these firms maintain warehouses in Kilgore, Tex.

New Manager of Export Department

The W-K-M Co., Inc., Houston, Tex., has appointed G. M. Stewart export manager in charge of foreign sales, succeeding T. L. Putman, resigned. Mr. Stewart was formerly with W-K-M and more recently has been in the service of one of the major oil companies in Venezuela.

Since 1926 W-K-M has maintained its own export office and personnel in New York, and further to facilitate the handling of export business will have resident salesmen in active foreign fields. The W-K-M export office is at 74 Trinity Place, New York.

Weber Opens Branch in Pampa

Weber Engine Co., Kansas City, Mo., has opened a branch in Pampa, Tex., at 107 South Hobart Street, where a complete stock of engines, clutches and repair parts is carried. E. C. Noble, who is in charge, was moved from the East Texas territory to the Panhandle. He formerly covered the Panhandle territory and has been with Weber 16 years.

272 YEARS DEVOTED TO MAKING JONES SUCKER-RODS

The seven men represent 272 years of experience in making Jones sucker-rods. That is the total number of years they have been with the S. M. Jones Co., Toledo, Ohio. Two started in 1894. Left to right: John F. Jenssen, 45 years; Charles C. Anselm, 41; Walter F. Lewinski, 36; Paul Munk, 25; Henry C. Willey, 43; Percy C. Jones, 37; Louis H. Stritmatter, 45. The picture was taken at the recent birthday party given by the employes for their president, P. C. Jones.

Important Improvements Mark Oil Well's New Casinghead

Oil Well Supply Co. has developed a new casinghead featuring several important improvements. It is of octagonal shape, with straight sides

for convenience in making up with tongs. Compact construction provides low overall height, which is desirable for many applications. Eight set-screws facilitate keeping the packing tight by applying uniform pressure.

The "Oilwell" Type 38 casinghead is furnished in both semisteel and cast steel. Working pressures as high as 800 and 1,600 pounds per square inch are permissible for the semisteel and cast-steel heads, respectively (provided the load on the tubing-hanger is sufficient to prevent leakage at the packing).

The Type 38 casinghead will receive any tubing-hanger designed for use with a common or Berry-pattern head, but is especially recommended for combination with the "Oilwell" Type 36 tubing-hanger as illustrated. This tubing-hanger is described as safe, simple and inexpensive.

A three-segment, hardened-steel slip assembly in the Type 36 tubing-hanger holds the tubing securely and without crushing. A spring encircling the three segments assures proper contact with the tubing before the taper of the slips and the bowl-shaped slip body becomes operative. The slip body rests on the packing element and utilizes the weight of the tubing string for compressing the packing.

The Type 36 tubing-hanger is described in "Oilwell" bulletin 166. Bulletin 196 covers the Type 38 casinghead.

Changes in Chain-Hoist Design Embodied in Power Master

Important changes in spur-gear chain-hoist design have been incorporated in the new Coffing

Power Master chain hoist, announced by Coffing Hoist Co., Danville, Ill. These changes result in time and money savings, and the product is said to meet the hardest conditions of industrial application.

The Power Master has such features as controlled gravity lowering; that is, the lowering speed is controlled by clutch and governors. The hoist is positive in action, and the load may be stopped at the fractional part of an inch. There is no hand-over-hand operation of the chain to lower the load. A time- and money-saving feature is the free chain for quick up or down load chain adjustment. When there is no load on the hoist, pulling down on the right side of the hand chain permits the load chain to be adjusted to the load without waste motion on the hand chain. This feature not only saves times but is fool-proof, as there are no ropes to confuse the operator, and it is impossible to drop the load.

The Power Master is built in capacities ranging from 1 to 8 tons, with unit weights as low as 86 pounds for the 1-ton and only 169 pounds for the 8-ton.

Feature of New Bolt-Threader Is Positive Die Adjustment

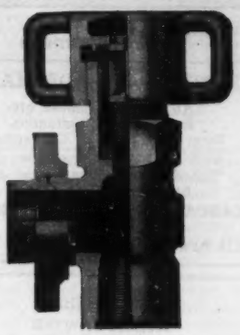
The Toledo No. 101 adjustable bolt die stock, announced by the Toledo Pipe Threading Machine Co., Toledo, Ohio, is a new and improved small compact bolt-threader for one-quarter inch to five-eighths inch rods, either U.S.S. or S.A.E., and three-eighths inch, seven-sixteenths inch and one-half inch pump rod.

The unique feature of this tool is the positive die adjustment for over, under, and standard threads. Segmental dies that are easily reground are used, and they are adjusted by turning the knurled cam ring. Each die segment, even when standard setting is changed, takes a proporational share of the work, which makes easier cutting, smoother threads and longer die life.

Dies and guides are changed quickly. The die stock is 17 inches over-all and weighs only 2¾ pounds. A small partitioned red enameled box can be furnished measuring 7¼ by 4¾ by 1¾ inches holds a die stock with six sets of dies and guides. All bright parts are highly polished and the die stock is enameled black. Any combination of dies within the capacity of this adjustable bolt die stock can be furnished.

Stuffing-Box of Advanced Type Offered by Well Equipment

Well Equipment Manufacturing Corp., Houston, Tex., has introduced an advanced design of stuffing-box, built in two styles, which features simplicity and durability. The illustration shows the Type A. The Type B differs in that it does not have a tee connection. Type A eliminates the use of a tee fitting on the box and also allows the box to be set lower.



An oil reservoir in the cap, or crown, furnishes lubrication for the polished rod, and keeps out grit or dirt. A bronze bushing is located on top of the stuffing-box rings, which allows the oil to circulate between the bushing, crown, and rod. Both the oil reservoir and bushing are interchangeable between the two types. Any common type of packing-ring of the proper size may be used.

The packing-rings are adjusted by a slight turn of the cap, which provides an evenly distributed pressure on the rings, due to the precision fit of the gland. Wear on the polished rod is reduced, and fire hazard is said to be eliminated.

The Weco stuffing-box effects a saving to operators, especially when used on shallow production, the manufacturers say.

REGO TANKCAR SYSTEM REDUCES EVAPORATION LOSSES

Excessive evaporation losses and the hazards involved in the transporting of casinghead gasoline in tankcars have long been recognized as problems. In many instances gasoline is loaded into vented cars and large quantities of dangerous vapors are discharged to the atmosphere. Vapor pressure builds up during transit, and before unloading it is necessary to reduce this pressure by venting off vapors. This venting of casinghead gasoline often requires several hours in the summer time and

200 to 600 gallons of gasoline are lost when these vapors are released.

The RegO tankcar system developed by the Bastian-Blessing Co., 240 East Ontario Street, Chicago, is designed to provide a solution to these problems. This system allows gasoline to be loaded, transported and unloaded with the tankcar remaining under pressure. This is accomplished without making any major structural changes in the tankcars regularly used for casinghead gasoline. The vent and loading nipples are removed and replaced by the RegO transport cap adaptors. These transport adaptors are the only parts remaining on the car. The RegO filler and vapor assemblies are attached to the loading and unloading hoses and they remain as a permanent part of the loading-rack equipment.

A slip tube gauge and thermometer assembly is provided for the vapor assembly. This allows for gauging level, correcting for temperature and taking sample, while keeping the system closed at all times. A leaflet offered by the company describes the purpose of the various assemblies which make up the complete RegO tankcar system.

CLASSIFIED ADVERTISING

Patent Attorneys

PATENTS — TRADE MARKS

All cases submitted given personal attention.

Form **"Evidence of Conception"** with instructions for use and **"Schedule of Government and Attorneys' Fees—FREE**

LANCASTER, ALLWINE & ROMMEL
Patent Law Offices
418 Bowen Bldg., Washington, D. C.

JACK A. SCHLEY
PATENT LAWYER

Patents obtained — infringement practice in all Courts—oil field experience. 1807-11 Tower Petroleum Bldg., Dallas. 2014 Second Nat'l. Bank Bldg., Houston. 707 Insurance Building, San Antonio. 433 Munsey Building, Washington, D. C. Address any of these offices.

Leases and Drilling Blocks

LEASES—East Texas, La., South Ark. 20 acres up, dollar acre up.—Owners—Address Attorney, Box 1122, Little Rock, Ark.

DRILLING deals wanted 50,000 acres Southern Illinois in and around production area. Elmer Gant, Anna, Illinois.

ILLINOIS 60,000 acres in and near production. Illinois Minerals Company, Cairo, Illinois.

SOUTHEAST Missouri Block of leases available for drilling deal. Magnetometer survey reports by state geologist available. F. G. Felden, Cape Girardeau, Mo.

320 ACRES, Crane Co., Tex., Magnolia lease, cheap in fee. Address 415 Littlefield Building, Austin, Texas.

5 ACRE Mineral Deed, Landowners Royalty under entire 80 acres of land leased to Gulf Oil Co. being N½ NW¼ Sec. 30, Twp. 14s, Rge. 31e, full price only $32.50. Perpetual and full participating. Send your check. Guarantee delivery. P. O. Box 968, Hobbs, New Mexico.

HOT SPOT LEASES
Forest City Basin, North Missouri. Get them while cheap, some close to wells $1.50 acre, up. Box 152, Milan, Mo.

I HAVE several good blocks of leases located on good structure in Kentucky, all leases regular 10 yr. with 25c rental after first year, will give necessary acreage for test well, drilling cost around Three Thousand dollars complete also have acreage near drilling wells for sale at $1.00 to $10.00 per acre. Box 612, Owensboro, Ky.

NEW 10 yr. lease sec. 11 6n 3w McClain Co. Okla. favorable geology. Joe P. Crawford, fee owner, Oklahoma City, Okla.

HAVE 40 acres not leased, ¾ Mi. west and south of the M. O. Cavalin tract on which is located Sun Co.'s #1 M. O. Cavalin in the west Palacios or buttermilk slough area, Gulf Coast, Texas. This is the N.E. 40 of 240 acre T. J. McAvan Estate, balance being leased to The Sun Oil Co. Want a drilling proposition and will consider sale of part of royalties on adjoining acreage if desired. B. J. Wesselman, Salisbury, Mo.

ATTENTION LEASE BROKERS
Have several thousand acres for sale around drilling well in N.E. Mo. Good Geology. Address Box J-934, The Oil and Gas Journal, Tulsa, Okla.

NOW AVAILABLE—4700 acres on eight structures in the shallow Kentucky-Tennessee field and on which D. B. Malernee, Geo. Key, Ben F. Davis, et al, of Oklahoma City hold large acreage. N. M. Sauls, Geologist. Byrdstown, Tenn.

FOR SALE Oil and gas leases on structure, leases joining production, ten-year term wildcat leases with low rentals, and producing leases all located in Kentucky shallow oil field. W. P. HARLEY, Bowling Green, Ky.

CHEAP ACREAGE
30,000 acres in Spencer and Perry Counties, Indiana. R. E. COPE, Rockport, Ind. Phone 175.

Leases and Drilling Blocks

WILL give ¾ interest for $18,000 to drill deep test on 1000 acres, 1½ miles S. W. of good well, ruined by inexperienced drillers and lack of capital at 1,481 ft. 20 ft. saturation. Illinois basin. Get details. Wm. H. Rennscheidt, 1814 E. "B" St., Belleville, Illinois.

NEW MEXICO
State Oil and Gas Leases
STOP FUMBLING. Buy on known structures where major companies own leases. 50c per acre. 5c rentals. Other leases as low as $6.00 per forty. Write for list. Twenty years in the business without a complaint.
HARRY S. WRIGHT, STATE LESSEE
Registered Dealer—State of Iowa
Box 166, Council Bluffs, Iowa
Box 347, Santa Fe, New Mexico.

SEE Frank Boykin, Girard, Louisiana, for drilling block or blocks in heart of Richland Parish big gas field.

FOREST City Basin, Kans. & Mo. Leases, 40 acre tracts and drilling blocks. Margaret Haynes, R. #3, N. Topeka, Kansas.

HAVE leases near Gulf, Sun, Continental, Humble, Magnolia leases in geological approved area West Texas. Will sell spread or single leases. Exploration, Inc., Petroleum Bldg., Fort Worth, Tex.

UNUSUAL LEASE OPPORTUNITY
11,000 A. blk. NE. Mo., with 2500 ft. test well now drilling; A-1 reports by prominent geologists. Excellent opportunity for small and large investors to get in on ground floor. For limited time priced at $1.50 per acre up. Write Box J-933, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE or drilling contract, 6000 acres, surface geology—Randolph County, Ill. Box 116, Sparta, Ill.

ILLINOIS acreage in Boone County, Illinois, near Belvidere. Driller wanted on acreage basis. JOHN BOYD MEYERS, Belvidere, Illinois.

DRILLING CONTRACTORS WANTED
Have 30,000 acres in six choice blocks in Vernon County, Mo. Between 200 and 300 shallow wells have been drilled in this county, new ones being completed every few days. Deep wells started but uncompleted, lack of finances. Deep tests showed good possibilities. One had good showing of green, paraffin-base oil, but abd. due to lost tools. Earl S. Welpton, Nevada, Mo.

FOR Leases, Royalties, or Land in North Missouri (Forest City Basin) write N. W. Phillips, Milan, Mo.

Leasing and Drilling Blocks

OUTRIGHT sale of ⅞ lease and ¼ royalty, being 29/32 oil and mineral interests 900 acres scattered parcels of land within 5 mile radius north, south, and east of Hemphill, Sabine County, Texas. Abstracted to date, no indebtedness. A. J. Keith, 2509 Arbor, Houston, Texas.

OKLAHOMA GAS-OIL LEASE
320 A. Comb. gas-oil lease. Gas poss. aver. 5,000,000 cu. ft. 1150 ft. Oil poss. aver. 500 bbl. 2700 ft. near prod. and pipeline, ready sale, no pro. Write Box J-935, The Oil and Gas Journal, Tulsa, Okla.

MISSOURI Leases in blocks and scattered acreage. Harrah and Firth, Chillicothe, Missouri.

550 ACRES on pipeline. Never drilled. Offsets gas wells four sides. Will drill one well and assign lease and well $950.00.
BUDDENBORG
Osawatomie, Kans.

SACRIFICE 40-acre Oil Lease, Chaves County, for only $10.00, full price. Guarantee title. P. O. Box 191, Clovis, N. Mex.

Oil Industry Printing

OIL FIELD LEGAL BLANKS
Leases, assignments, releases, township plat books, well records, etc. Request on your letterhead gets free catalog. Olds Press, 215 East Third St., Tulsa, Okla.

Incorporations

DELAWARE CHARTERS: Complete service $35. Submitted forms. Chas. G. Guyer, Inc., Wilmington, Delaware.

CHARTERS — Delaware best, quickest, cheapest, more liberal. Free forms. Colonial Charter Co., Wilmington, Del.

Warehouse Space

WAREHOUSE SPACE FOR RENT

1,000 square feet warehouse space with office accommodation, dock facilities on Frisco trackage, Tulsa, Oklahoma.

1,000 square feet warehouse space with office accommodation, dock facilities—centrally located, Great Bend, Kansas.

Attendant on duty 24 hrs.—both locations.

Phone 4-0369 or apply at 41 So. Elwood, Tulsa, Okla.

LARKIN PACKER COMPANY

Financing

CAPITAL SEEKERS—Put your project before 260 Key-Men. Cost trifling. Details free. AMSTER LEONARD, Fox Theater Building, Detroit, Michigan.

CLASSIFIED ADVERTISING RATES

Classified advertising rates: First insertion, 35 cents a line; each additional insertion, 25 cents a line, PAYABLE IN ADVANCE. Six words usually make a line. Count as a word each one-letter word and each group of figures. White-space computed at regular line rate. Allow two extra lines for blind ads. Ads of less than three lines not accepted. No formal acknowledgement is made, and proofs cannot be shown in advance of publication.

	1 time	2 times	3 times	4 times		1 time	2 times	3 times	4 times
3 Lines	*$1.05*	*$1.80*	*$2.25*	*$3.30*	*7 Lines*	*$2.45*	*$4.20*	*$5.95*	*$7.70*
4 Lines	*1.40*	*2.40*	*3.40*	*4.40*	*8 Lines*	*2.80*	*4.80*	*6.80*	*8.80*
5 Lines	*1.75*	*3.00*	*4.25*	*5.50*	*9 Lines*	*3.15*	*5.40*	*7.65*	*9.90*
6 Lines	*2.10*	*3.60*	*5.10*	*6.60*	*10 Lines*	*3.50*	*6.00*	*8.50*	*11.00*

CLASSIFIED DISPLAY RATES

Classified Display is set with a border and may be used in one or two column sizes

1 Inch	*1 time*	*$5.00*
1 Inch	*13 times*	*4.50 per inch*
1 Inch	*26 times*	*4.00 per inch*
1 Inch	*52 times*	*3.50 per inch*

This space may be contracted for over a period of one year from the date of the first insertion and is PAYABLE IN ADVANCE, MONTHLY.

We reserve the right to withhold all advertising of questionable character. To avoid delay be sure to send remittance with copy. We will set your ad in the smallest amount of space possible and refund all overpayments. One-time insertions will not be run until fully paid. Forms close MONDAY NOON before each issue date.

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

Royalties

ANDREW J. BARRETT
The Philtower
Tulsa, Oklahoma.

Brokers—Salesmen

Sell in the most active area in the United States—The Permian Basin of West Texas and Southeastern New Mexico. From the standpoint of royalty investors this area has much to offer. Can supply you with choice non-producing royalties located on geophysical highs. Also drilling blocks, close in acreage to production, or wildcat leases. I maintain my own field men who cover this area for me. All offerings meet the requirements of the Security and Exchange Commission. Inquiries invited.

B. D. BUCKLEY
Paul Brown Bldg., St. Louis, Mo.

Producing and Non-Producing
OIL ROYALTIES
Registered Dealers Only.
GRIMES ROYALTY CO.
Hunt Bldg. Tulsa, Okla.

PRODUCING OIL ROYALTIES
15 years of experience.
L. H. WITWER
703 Kennedy Bldg., Tulsa, Okla.

WILL BUY non-producing landowners royalty—under drilling wells only. P. H. HAWLEY, 727 W. 7th St., Los Angeles, Calif.

OWNERS of fractional landowners royalty interests still paying send full details to City Investing Co., 434 Roosevelt Bldg., Los Angeles, Calif.

WANTED producing oil royalties and oil payments in North and West Texas and New Mexico. P. O. Box 1535, Fort Worth, Texas.

Contractors

FOREST City Basin—Complete cable tool contractors, deep wildcat holes, shallow information holes, clean-out service, turnkey prices. Office close to area, drillers familiar with formations. Good references. J. D. Judd & Son, Martin City, Mo. Phone Dwight 3273.

Survey Service

OIL FINDING DOWSING METHOD
My deductions a practical method which picks up vibratory reactions emanating from carbo-hydrates. Physico method finds oil, locates faults. Same method discovered great East Texas field also our Watson #2 first producer Wilmington, Calif. field. Employ a man that owns producing wells. I find oil if it exists or no charge. George Miller, 1548 Post, Torrance, California.

Legal Blanks

SINCE 1908 Burkhart's legal forms—serving Mid-Cont. oil fields, including Ill., La., Mo., Ind. & Ky. Free catalog & samples. Burkhart Ptg. & Sta. Co., 115 So. Cinn., Tulsa, Okla.

Equipment Wanted

WANTED: Spudder, with or without tools, suitable for 2000 feet; also well servicing winch for same depth. R. B. Somerville, Box 47, Mt. Pleasant, Mich.

RECORDING Pressure gauges wanted. State price, specifications and quantity. UNITED DEVELOPMENT CO., Chatham, Ontario, Canada.

WANT TO BUY Used 9⅝" Shaffer Blow Out Preventer; 6" O.D. Overshot and McNeely Shale Shaker with gasoline motor. P. O. Box 1360, Seminole, Okla.

WILL pay cash for machine capable of drilling 4,000 ft. Give comp. details. D. F. Sprouse, 1604 Arapahoe St., Denver, Colo.

REFINERY EQUIPMENT—PIPE—STORAGE TANKS

Vessels-Towers-Condensers-Heat Exchangers-Boilers-Pumps-Valves-Fittings-
Complete Stock All Other Items
Line Pipe 2"-2½"-4"-6"
Priced for Immediate Sale.

Send us your inquiries for storage tanks, any size.
Will quote tank erected your grade any location.

SONKEN-GALAMBA SUPPLY COMPANY

W. C. Berry or H. J. Galamba,
Riverview at Second, Kansas City, Kansas

Robt. W. Duden,
2100 S. Union, Tulsa, Oklahoma

25 K.W. and 40 K.W. Gas Engines, 220 volts, D.C. Two 100 K.W. Gas Engine-Generator Sets, 220 volts, D.C. 7x6 Ingersoll-Rand ER-1 Air compressor. Six-inch Oster Pipe Threading Machine. Also large stock of lathes, pipe machines, milling machines, etc. Send for our list.
Terms to suit.
CINCINNATI MACHINERY & SUPPLY CO.
26 West 2nd St. Cincinnati, Ohio.

FOR SALE: At Oklahoma City No. 4A National Tank Oil and Gas Separators 500# working pressure. I. T. I. O. Co., Bartlesville, Oklahoma.

PENNSYLVANIA REFINERY

SACRIFICE SALE

FOR QUICK DISPOSAL

Location northwestern Pennsylvania. Capacity 1500 barrels crude daily. Modern pipe still distillation unit. Percolation filter plant complete with Herschoff burner, cold settling bright stock and wax press, neutral equipment, good boiler plant, excellent water supply, ample storage. Could be placed in operation in seventy-two hours. Ideal location for refining Illinois Crude where now located or can be moved. Will consider selling any part.

Box 481, Kane, Pennsylvania

FOR SALE
3,000 barrel Cracking Unit located in Oklahoma. This unit is in good condition and could be converted to a combination skimming and cracking unit to handle 6,000 barrels of crude daily by the addition of pumps, towers and exchangers. Box 2009, Tulsa, Oklahoma.

FOR SALE: Model K04, 150 H.P. Cummins Diesel Drilling Engine less than one-half price. This unit about one year old.—General Machine & Supply Company, Wichita Falls, Texas.

FOR SALE: 1 Bruning Drafting Machine complete, slightly used, purchased in 1938. Address: 2821 First National Bldg., Oklahoma City, Oklahoma.

FOR SALE: 2—OCS chain driven reconditioned sand reels, I. T. I. O. Company, Bartlesville, Oklahoma.

FOR SALE: Used large capacity positive and orifice gas meters. Geo. R. Milner. Okmulgee, Oklahoma.

TRACTORS
Government crawler type Caterpillars, 5 ton $375, 10 ton $695, Slightly used. Perfect condition.
O. C. EVANS
Mt. Sterling, Ky.

FOR SALE
2" Upset Williamson and Merla Flow Valves. Perfect Condition. $45.00 each. JOHN W. HERBERT, 915 Neil P. Anderson Bldg., Fort Worth, Texas.

FOR SALE 45 Star Spudder Complete with tools and equipment, 13 inch down to 6⅝ inch. Also 60 Caterpillar tractor J. L. Gardenhire, Centralia, Illinois.

SPUDDER FOR SALE
55 Heavy duty Wichita Falls spudder complete with belts, drilling and small tools, steel tool house and $1500.00 all-steel mast Le Roi drilling engine. Will handle 4500-foot work; all complete and in A-1 condition. Located in Illinois, price $5000.00 cash, no trades. C. L. JORDAN, 1508 Shelby Avenue, Mattoon, Illinois. Phone 1392.

ENGINE—Factory Reconditioned Weber Horizontal Bronze Bearing OIL Engine. 15" Bore by 15" Stroke, rated 60 H. P. Engine equipped with special wide-face flywheels to accommodate 12" wide flat belt. Particularly adapted for driving electric generator. Weber Engine Company, Kansas City, Mo.

FOR SALE—Steel riveted smoke stack. Self supporting. Diameter 9 feet, height 126 feet. Like new. Can ship on day's notice.
High and low pressure refinery valves. Standard makes. Sizes ¾ inch to and including six inch. Subject to test inspection. Harvey Bros., 706 Rudd, Canon City, Colorado.

FOR SALE
1—6' x 52' Jenkins Bubble Tower.
1—5' x 30' Jenkins Reflux Tower.
1—10' x 14' Jenkins Clay Tower.
1—1000 bbl. Power Specialty Co. Pipe Still.
Miscellaneous Tanks and Equipment.
Western Tank & Road Supply Co.,
Wichita, Kansas.

FOR SALE CHEAP: Two Southwestern Distillation Units; Tanks; Steel Buildings; High Pressure and Low Pressure Absorbers. Globe Gasoline Co., Blackwell, Okla.

FOR SALE
HOUSTON, TEXAS INDUSTRIAL DISTRICT. 27 acres whole or part. Steel shed 75x300; equipped with 7 ton Milwaukee traveling crane, ideal for oil tool manufacturing plant. Rail, water, highway connections. Further details upon request. Write, phone, or wire: The Vaughan Lumber Co., P. O. Box 1447, Houston, Texas.

WILL sell cheap for cash or will trade 20" reconditioned Lucey rotary table for what have you. O. K. Pipe and Supply Co., Box 4441, Oklahoma City, Okla.

FOR SALE: Drill pipe. Bargain for quick sale of 1,260 feet of New Size "A" (1½") core drill, drill pipe. Pipe in original crates, never used or uncrated, perfect condition. TOM WESTBROOK, Corsicana, Texas.

ENGINE—Factory Reconditioned Weber Horizontal Bronze Bearing GAS Engine. 14" Bore by 14" Stroke, rated 50 H.P. Right-hand flywheel sheave type especially for driving electric generator. Weber Engine Company, Kansas City, Mo.

FOR SALE IN ILLINOIS
100 feet 12½ in. Lapweld casing bought new three months ago run once, $1.75 per foot. 550 feet 10 in. Lapweld casing 35 lb. $1.25 per foot. 1275 feet 9 in. O.D. Lapweld casing 28 lb. $0.85 per foot. 1450 feet 7 in. O.D. lapweld casing 28 lb. $0.70 per foot. Above pipe in good condition.
C. L. JORDAN
1508 Shelby Ave. Phone 1392
Mattoon, Illinois.

FOR SALE: CIW steam operated, McEvoy hand operated blowout preventers, high pressure steel drilling and manifold gate valves, cable tools, oil and gas separators, butane tanks, well servicing units, I. T. I. O. Co., Bartlesville, Okla.

FOR SALE: Sectional Steel Buildings 1—30 x 10 x 60 standing; 1—20 x 8 x 128 K. D. Oklahoma City; 1—24 x 8 x 106 K. D. Seminole, condition O.K. Inspection invited. I. T. I. O. Co., Bartlesville, Okla.

For Sale—Maps

1939 EDITION MAP OF TEXAS
and Eastern New Mexico shows all OIL and GAS FIELDS up to date
$1.00 per copy
WILDCAT MAP published monthly on same area $3.00 per copy $30.00 one year.
ZINGERY OIL MAP COMPANY
Fair Bldg. Fort Worth, Tex.

SPARTA-WILCOX GULF COAST
Geological map showing 158 Geophysical prospects and 85 producing salt domes in Louisiana and 51 Geophysical prospects and 57 Major Company's blocks outlined in Mississippi. Price $100.00.
OIL INFORMATION SERVICE
P. O. Box. 601, Tulsa, Oklahoma

MAP BOOK of all Texas counties 254 maps, each 14x16 inches. Show: Sections, blocks, surveys, certificate and abstract numbers. With Binder. Postpaid $10.00.
OIL CITY MAP CO.
Box 925, Longview, Texas.

TWO NEW MAPS

(1) SPARTA-WILCOX TREND MAP

AREA COVERED: Lower portions of Arkansas and Mississippi, State of Louisiana, Eastern portion of Texas extending west to Lavaca County.

SHOWS: Oil and gas fields in color and pools producing from Sparta-Wilcox; Index giving official pool names and location on map; approximate boundaries of Sparta-Wilcox Trend; Major structural features, as Sabine Uplift, Monroe Uplift, Angelina-Caldwell Flexure, Monroe Tunica Flexure; Dry holes with elevations and total depths in State of Mississippi.

SIZE: 38" x 48" SCALE: 1" = 12 miles

PRICES: $12.50 paper $15.00 linen.

(2) FOREST CITY BASIN MAP

AREA COVERED: Southeast Nebraska, Southwest Iowa, Northeast Kansas and Northwest Missouri.

SHOWS: Oil and gas pools in color with official pool names; dry holes with elevations and total depths; location of 14 wildcat tests, giving operator and farm name, Counties, County Seats, Township, Range, and Sections.

SIZES: 36" x 42" SCALE: 1" = 6 miles

PRICES: $10.00 paper $12.50 linen

E. C. JACOBSON
801 McBirney Bldg. Phone 2-1952
Tulsa, Oklahoma.

MISSISSIPPI-ALABAMA MAPS
Take off and base maps of all active areas. R. B. Robinson Maps, Jackson, Miss.

Classified advertising is productive from a standpoint of unit cost per inquiry running as low as 3c per reply.

Why waste time and money dickering around when you can reach your prospects through the medium they have chosen themselves?

Classified Department
THE OIL AND GAS JOURNAL, Tulsa, Okla.

Situations Wanted

GRADUATE PETROLEUM ENGINEER—14 years' experience in production and geological work. Several years in supervisory capacities. Supervision of drilling and development a specialty. Desire connection with reliable firm. References if needed. Address Box J-882, The Oil and Gas Journal, Tulsa, Oklahoma.

Complete coverage of pipe lines and refineries in Texas and Louisiana. Can handle another account, commission basis, with exclusive territory rights. Fourteen years in field. Technically competent. Address
Box J-880
The Oil and Gas Journal
Tulsa, Oklahoma.

REFINERY Engineer thoroughly experienced maintenance, construction all types modern refinery units. Executive background. Technically trained. Consider any location, any reasonable offer. Address Box J-905, The Oil and Gas Journal, Tulsa, Okla.

REGISTERED Texas petroleum and natural-gas engineer desires connection with natural-gas or natural gasoline firm. Thirteen years' experience in all divisions of natural gasoline and last five years in charge of production at large modern plant. Capable of assuming full charge of entire plant and field system. Address Box J-930, The Oil and Gas Journal, Tulsa, Okla.

CHEMICAL Engineer, Graduate Lwow Technical University. Wide research experience (seven years in Polish and English research laboratories) in the whole field of petroleum technology, especially with asphaltic bitumen, seeks situation. Address Box J-932, The Oil and Gas Journal, Tulsa, Okla.

Help Wanted

SUPERINTENDENT of construction and maintenance desired by small but complete petroleum refinery in central state. Must have experience in erecting new constructions and repairing and inspecting modern refinery equipment. Address Box J-921, The Oil and Gas Journal, Tulsa, Okla.

CHEMIST exp. in asphalt testing and manufacture desired by petroleum refinery. Address Box J-931, The Oil and Gas Journal, Tulsa, Okla.

Business Opportunities

FOR SALE: Estab. Welding shop. Oilfield work. Plenty work for right man. Frame Bldgs. Good portable Equip., Truck, Tools. $3,500.00 cash. Reason for selling. Address Box J-923, The Oil and Gas Journal, Tulsa, Okla.

KINGWOOD OIL COMPANY'S 10% Cumulative $10 par Preferred stock, with $6.66 back dividends now due, offer a real opportunity to share large profits from its Illinois production and extensive operations. For quick sale we can deliver 3,000 shares at $9.60 per share. Wire. GLOBE SECURITIES CO., LTD., OKLAHOMA CITY, OKLA.

EXPERIENCED operator wants MONEY for acreage and drilling semiproven shallow oil and gas field, Anderson County, Kansas. Wonderful opportunity. W. L. Morris, Box 314, Garnett, Kans.

GREASEMAKER AND PETROLEUM SPECIALTIES COMPOUNDER, 14 years with major company, yearly production five to nine million pounds, over sixty different greases, lime soap, soda soap, mixed base, metallic base (aluminum, zinc), sett greases, for Automotive, Industrial, Agricultural and Marine fields. Products made to A.S.T.M. specifications, melting point, original and worked penetrations or to customer requirements.
Petroleum Specialties includes extreme pressure lubricants, fly, animal, poultry house sprays, shingle stains, asbestos roof coating, roof paint, mineral castor oils, chain and cable lubricants, liquid hand soap, metal cleaners and many others. Will manufacture above products in your plant on percentage basis or will consider 50-50 partnership with right party with past experience in sales who can share investment of $5,000 to $6,000.
For further particulars write to Box J-936, The Oil and Gas Journal, Tulsa, Okla. All replies strictly confidential.

Mailing Lists

ROYALTY Lists. Unit Owners Lists. Stockholders Lists. By states. Oil Industry Mailing List Co., Tulsa Loan Bldg., Tulsa Oklahoma.

3,500 up-to-date producing royalty owners names and addresses Oklahoma. 800 East Texas. 850 Registered oil and gas dealers. Revised. 1 cent per name. $10 minimum order. OIL INFORMATION SERVICE, P.O. Box 601, Tulsa, Oklahoma.

Index to Advertisers

A

Abercrombie, J. S., Co. 201
Abercrombie Pump Co. 217
Air Reduction Sales Co. .....
Ajax Iron Works .....
Alco Products Division — American Locomotive Company 72B
Allegheny Ludlum Steel Corporation 171
Allis-Chalmers Mfg. Co. .....
Allsteel Products Mfg. Co., The ..
American Bosch Corporation .....
American Cable Division of American Chain & Cable Co., Inc. ..
American Cast Iron Pipe Company 166
American Hoist & Derrick Co. ...
American Iron & Machine Works
American Meter Company 42
American Sand-Banum Co., The 218
American Steel & Wire Company 35
Armstrong Machine Works 15
Athey Truss Wheel Co. 215
Atlas Drop Forge Co. .....
Atlas Imperial Diesel Engine Co. 206
Atlas Supply Co. .....
Auer, C. L. & W. W. .....
Axelson Manufacturing Company

B

Baash-Ross Tool Company .....
Babcock & Wilcox Tube Co., The 120
Badger & Sons Co., E. B. 33
Bakelite Corporation .....
Baker Oil Tools, Inc. 44
Baldwin-Duckworth Chain Corp. ..
Bantam Bearings Corp. .....
Baroid Sales Company .....
Barret, William M., Inc. .....
Bastian-Blessing Co., The 166
Beaumont Iron Works Co. .....
Bethlehem Steel Co. 1
Billings & Spencer Co., The 217
Boston Woven Hose & Rubber Co.
Braden Steel Corporation 137
Bradford Motor Works, Inc. .....
Brewster Company, The .....
Bridgeport Machine Company 125
Bristol Company, The 165
Broderick & Bascom Rope Co. ....
Brown Instrument Co., The 146
Bruning, Charles, Co., Inc. 27
Buckeye Traction Ditcher Co., The
Bucyrus-Erie Company .....
Butler Manufacturing Co. 119
Byron Jackson Co. 105

C

Cable, Jo H. .....
Cameron Iron Works, Inc. .....
Carey Company, The Philip 34
Carnegie Illinois Steel Corporation
Case, J. I., Company 191
Cast Iron Pipe Research Association, The .....
Caterpillar Tractor Co. 212-213
Century Electric Co. .....
Chain Belt Co., The 11
Chaplin-Fulton Mfg. Co., The 160
Chapman Valve Mfg. Co., The 26
Chemical Process Co., Inc., The ..
Chevrolet Motor Division, General Motors Sale Corporation .....
Chicago Bridge & Iron Company 36-37
Chiksan Oil Tool Co., Ltd. .....
Clark Brothers Company .....
Classified Advertising 238-239
Cleveland Trencher Company ....
Climax-Molybdenum Company ... 89
Columbia Steel Company 35
Columbian Steel Tank Co. .....
Continental National Bank of Fort Worth .....
Continental Oil Co. .....
Continental Supply Company, The 197
Cooper, Fred E. .....
Cooper-Bessemer Corp., The 68
Core Laboratories, Inc. .....
Crane Co. 7
Cummins Engine Co. 189
Curtin, W. H., & Co., The 220

D

D & B Pump and Supply Co. .....
Darling Valve & Mfg. Co. 12
Davis Regulator Co. 149
Dayton Rubber Mfg. Co., The 116-117
Diamond Chain & Manufacturing
Dodge Mfg. Company .....
Doheny Stone Drill Co. .....
Dowell, Incorporated .....
Dragon Mfg. Co., The .....
Dresser Mfg. Co. .....
Du Pont de Nemours & Co. Inc. 25-126

E

Eagle Picher Lead Co. 3
Eastman Oil Well Survey Co. .....
Economy Electric Lantern Co. ....
Edeleanu Company, Ltd. 161
Edward Valve & Mfg. Co., The 85
Emsco Asbestos Company .....
Emsco Derrick & Equipment Company .....
Enardo Foundry & Mfg. Co. 160
Ensign Carburetor Company, Ltd.
Ethyl Gasoline Corporation ....
Evansville Chamber of Commerce 152

F

Failing, George E., Supply Company .....
Fairbanks-Morse .....
Filtrol Corp. 99
First National Bank of Fort Worth
First National Bank in Houston ..
First National Bank & Trust Co. of Tulsa, The .....
Fisher Governor Company .....
Fluor Corporation, Ltd., The 123
Foote Bros. Gear and Machine Corporation 207
Ford Motor Co. .....
Fort Worth Chamber of Commerce
Fort Worth Clearing House Association .....
Fort Worth National Bank, The
Foster Wheeler Corp. 14
Four Wheel Drive Auto Co., The
Foxboro Co., The 18
Franks Mfg. Co. .....
Frick-Reid Supply Corporation 130-131
Frost National Bank .....

G

Gardner-Denver Company 40
Garlock Packing Company, The ..
Gaso Pump & Burner Mfg. Co. ...
Gasoline Products Co., The 9
Gates Rubber Co., The .....
Gatke Corporation 192
General American Transportation Corporation—Terminal Division
General Electric Company .....
General Motors Truck .....
General Paint Corporation 170
General Power, Inc. 204
Geophysical Service, Inc. .....
Gilmer Company, L. H. .....
Gilmore Wire Rope Division of Jones & Laughlin Steel Corporation .....
Girdler Corporation, The .....
Goodall Rubber Co. .....
Goodrich Co., B. F., The .....
Goodyear .....
Gott, H. P., Mfg. Co. .....
Gouids Pumps, Inc. .....
Graver Tank & Mfg. Co., Inc. ... 177
Gray Processes Corporation, The 30
Grossrohr-Verband G.m.b.H. .....
Guiberson Corporation .....
Gulf Oil Corp. .....
Gulf States Utilities Co. .....
Gustin-Bacon Mfg. Co. .....

H

Haering, D. W., & Co., Inc. .....
Halliburton Oil Well Cementing Co. ..... Inside Front Cover
Hanlon-Buchanan, Inc. ..Front Cover
Happy Belting Company .....
Harnischfeger Corporation 198
Harrisburg Steel Corporation 17
Hazard Wire Rope Division of American Chain & Cable Co. Inc.
Hercules Tool Company .....
Hewitt Rubber Corp. .....
Hill-Hubbell & Co. 170
Hoard Exploration Company ....
Houston Lighting & Power Company .....
Hughes Tool Co. ..... Back Cover
Humble Oil & Refining Co. 38
Hunt Tool Company .....
Hydril Co. .....

I

Independent Exploration Company
Inferno Co., The .....
Ingersoll-Rand Co. 19
International Derrick & Equipment Co., The .....
International Geophysics, Inc. ...
International Harvester Co. 101
International Nickel Company, Inc., The .....
International Petroleum Exposition

J

Jarecki Manufacturing Company ..
Jensen Brothers Manufacturing Co.
Jerguson Gage & Valve Co. 218
Johns-Manville Corporation 211
Johnston, M. O., Oil Field Service
Jones & Brooks, Inc. .....
Jones Company, S. M. .....
Jones & Laughlin Steel Corporation .....
Jones-Shelburne, Inc. .....

K

Kane Boiler Works, Inc. .....
Kellogg, M. W., Company, The 41
Kennedy Valve Mfg. Co., The 173
Kerlow Steel Flooring Co. 203
Kerotest Manufacturing Co. .....
Keuffel & Esser Co. .....
Key Company 90
Keystone Driller Co. .....
Kibele Manufacturing Co. .....
Kinley Co., M. M. .....
Kinzbach Tool Co. .....
Klinger, Rich. A. G. 160
Kobe, Incorporated .....
Kropp Forge Company .....
Krupp 169

L

Landis Machine Co., The 8
Lane-Wells Co., The .....
Larkin Packer Company, Inc. ..... Inside Back Cover
Layne & Bowler, Inc. .....
Leeds & Northrup 97
Leland Equipment Co. .....
Lennox Hotel 218
Le Roi Company .....
Leschen, A., Sons Rope Co. .....
Lincoln Electric Company, The .. 71
Line Scale Co., Inc. .....
Link-Belt Company 219
Lockheed Aircraft Corporation .. 179
Lone Star Cement Corporation ..
Lonergan, J. E., Co. 157
Lucey Products Corporation .....
Ludlow Valve & Mfg. Co., The ...
Lufkin Foundry & Machine Co. ..
Lufkin Rule Co., The .....
Lummus Co., The 145
Lunkenheimer Co., The .....

Mc

McGregor Working Barrel Company .....
McKissick Products Corp. .....

M

MacClatchie Manufacturing Company .....
Macwhyte Co. .....
Magnolia Airco Gas Products Co.
Maloney Tank Mfg. Co. .....
Manhattan Rubber Mfg. Division
Mannesmannrohren Werke .....
Marley Company, The 154
Marmon-Herrington Co., Inc. .....
Marsh, James P., Corp. 191
Martin-Decker Corp. .....
Maschinenfabrik Imperial G.m.b.H.
Mathey Machine Works, C. A. .....
Mauser, K.-G. 183
Mayfair Hotel .....
Medart Company 180
Merco Nordstrom Valve Co. .....
Meehanite Research Institute 208
Metric Metal Works 42
Midco Tool & Supply Co. .....
Mid-Continent Supply Co. .....
Midwest Piping & Supply Company, Inc., The 29
Miller Sand Pump Co., The .....
Mission Mfg. Co., The .....
Mudrite Products Co. .....
Murcell, Inc., U. C. .....
Murphy Diesel Company, Ltd. ....
Muskogee Iron Works .....

N

National Bank of Tulsa 128
National Carbon Co., Inc. 151
National Geophysical Co. .....
National Gunite Contracting Co. . 173
National Lead Company .....
National Supply Co., The 67
National Transit Pump and Machine Co. .....
National Tube Co. 134-135
Naylor Pipe Company .....
New Bedford Cordage 200
New Deal Specialty Co., The .....
Newman, Hender & Co., Ltd. 144
Nitrose Company, Inc., The .....
Novo Engine Co. .....

O

O'Bannon Co., Walter .....
Oil Center Tool Co. 200
O.C.S. Mfg. Co., The .....
Oil Equipment Manufacturing Co.
Oil Industry Mailing List Co. ....
Oil Well Mfg. Co. .....
Oil Well Supply Company 141
Oil-World Exposition, Inc. 108-109
O.-K. Machine & Manufacturing Co.
Osage Metal Company .....
Oster Manufacturing Company ... 39
Otis Pressure Control, Inc. .....

P

Pacific Pump Works 139
Page Fence Association .....
Page Steel & Wire Division of American Chain & Cable Co. .. 24
Parkersburg Rig & Reel Co., The
Parkhill-Wade .....
Patent Chemicals, Inc. 163
Patent Fuels and Color Corp. 163
Patterson-Ballagh Corporation ...
Peerless Pump Division of Food Machinery Corp. 200
Penberthy Injector Co. .....
Pennsylvania Grade Crude Oil Association .....
Pesco, Inc. 106
Petroleum Advisers, Inc. 10
Petroleum Electric Power Club ..
.....142-143
Petroleum Rectifying Company .. 13
Phelps Dodge Refining Corporation 157
Philadelphia Gear Works .....
Pittsburgh-Des Moines Steel Company 111
Pittsburgh Equitable Meter Co. ..
Pittsburgh Steel Company .....
Plymouth Cordage Co. .....
Pomona Pump Co. 201
Portable Rig Co. .....
Prest Machine Works Co. .....
Price Co., H. C. .....
Pritchard, J. F., & Co. 167
Pure Oil Co. .....

R

Reading-Pratt & Cady Division of American Chain & Cable Co. Inc. 31
Rector Well Equipment Co., Inc.
Reda Pump Co. .....
Reed Roller Bit Company 201
Regan Forge & Engineering Co. 193
Reilly Tar & Chemical Corporation
Republic Rubber Division of Lee Rubber & Tire Corp. 112
Republic Steel Corp. 20-21
Ryerson & Son, Inc., Joseph T .. 218

S

St. Joseph Forward Association ..
San Antonio, City of
Schlumberger Well Surveying Corporation .....
Security Engineering Co. .....
Seismic Explorations, Inc. .....
Seismograph Service Corp. .....
Shafer Bearing Corporation 203
Shaffer Specialty Co., The .....
Shaffer Tool Works 209
Shand & Jurs Co. 159
Shell .....
S.K.F. Industries, Inc. .....
Skinner Co., M. B. .....
Smith, A. O., Corporation 4-5
Smith Company, E. M. .....
Smith, H. C., Oil Tool Co. 200
Smith Company, Howard .....
Smooth-On Mfg. Co. .....
Socony-Vacuum Oil Co. 16
South Chester Tube Co. .....
Southwestern Gas & Electric Company .....
Spang Chalfant, Inc. .....
Spang & Company, Inc. .....
Spartan Aircraft Company 95
Sperry-Sun Well Surveying Co.
Spicer Mfg. Corp. .....
Standard Brake Lining Co. 200
Star Drilling Machine Company
Stearns-Roger Manufacturing Co.
Sterling Engine Co. .....
Sturtevant Company, B. F. .....
Subterrex .....
Swartz, Stephen 203

T

Taylor Forge & Pipe Works .....
Taylor Instrument Companies 22
Technical Oil Tool Corporation ...
Texaco Development Corporation 23
Texas Electrical Service 184
Texas Iron Works .....
Thermoid Rubber Co. .....
Thornhill-Craver Co., Inc. 201
Timken-Detroit Axle Co. .....
Timken Roller Bearing Company 28
Timken Roller Bearing Company Steel and Tube Division 6
Toledo Pipe Threading Machine Co., The .....
Tretolite Co. .....
Trinity Portland Cement Company
Tubbs Cordage Co. .....
Tube Turns, Inc. 92
Tulsa Boiler & Machinery Co. ... 187
Tulsa Chamber of Commerce ....
Twin Disc Clutch Co. 2

U

Union Wire Rope Corporation ...
Unit Rig & Equipment Company ..
United Geophysical Co. .....
United States Rubber Company ...
United States Steel Corp., Subsidiaries 35-65-134-135-141
United States Steel Products Company 35-65-134-135-141
Universal Atlas Cement Co. 65
Universal Exploration Co. .....
Universal Oil Products Co. 87

V

Viking Pump Co. .....
Visco Products Company .....
Vogt, Henry, Machine Co. 32

W

Wall Rope Works, Inc. .....
Walworth Company .....
Warren Petroleum Corporation ..114
Watson-Stillman Co., The 194
Waukesha Motor Co. 171
Well Equipment Mfg. Corp. .....
Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co. 168
Wheatley Bros. .....
Wheland Co., The .....
Whitney Chain & Mfg. Co., The ..
Wickwire Spencer Steel Company
Williams & Co., J. H. .....
Wilson Manufacturing Co. .....
Wilson Welder & Metals Co., Inc.
Witte Engine Works .....
W-K-M Company, Inc. .....
Worthington Pump & Machinery Corporation 133
Wyatt Metal & Boiler Works 102

Y

Young Engine Corp. .....
Young Radiator Company .....
Youngstown Sheet & Tube Co. ...

Z

Zink Burners, John 162

The Oil Man's Calendar appears on Page 72

LARKIN Bull Plugs and Swages

Like Old Shoes -

you eat them and forget them!

Operators have no trouble or bother with Larkin Swaged Nipples and Bull Plugs—they voice nothing but entire satisfaction. That's because no other plug or nipple even approaches LARKIN in quality, uniformity and dependability. It's perfectly logical for operators to be enthusiastic about these masterpieces of accurate engineering.

Larkin Seamless Bull Plugs are pressed from NEW flat strip steel, cupped and drawn into plugs which have neither seams nor welds at the side or end.

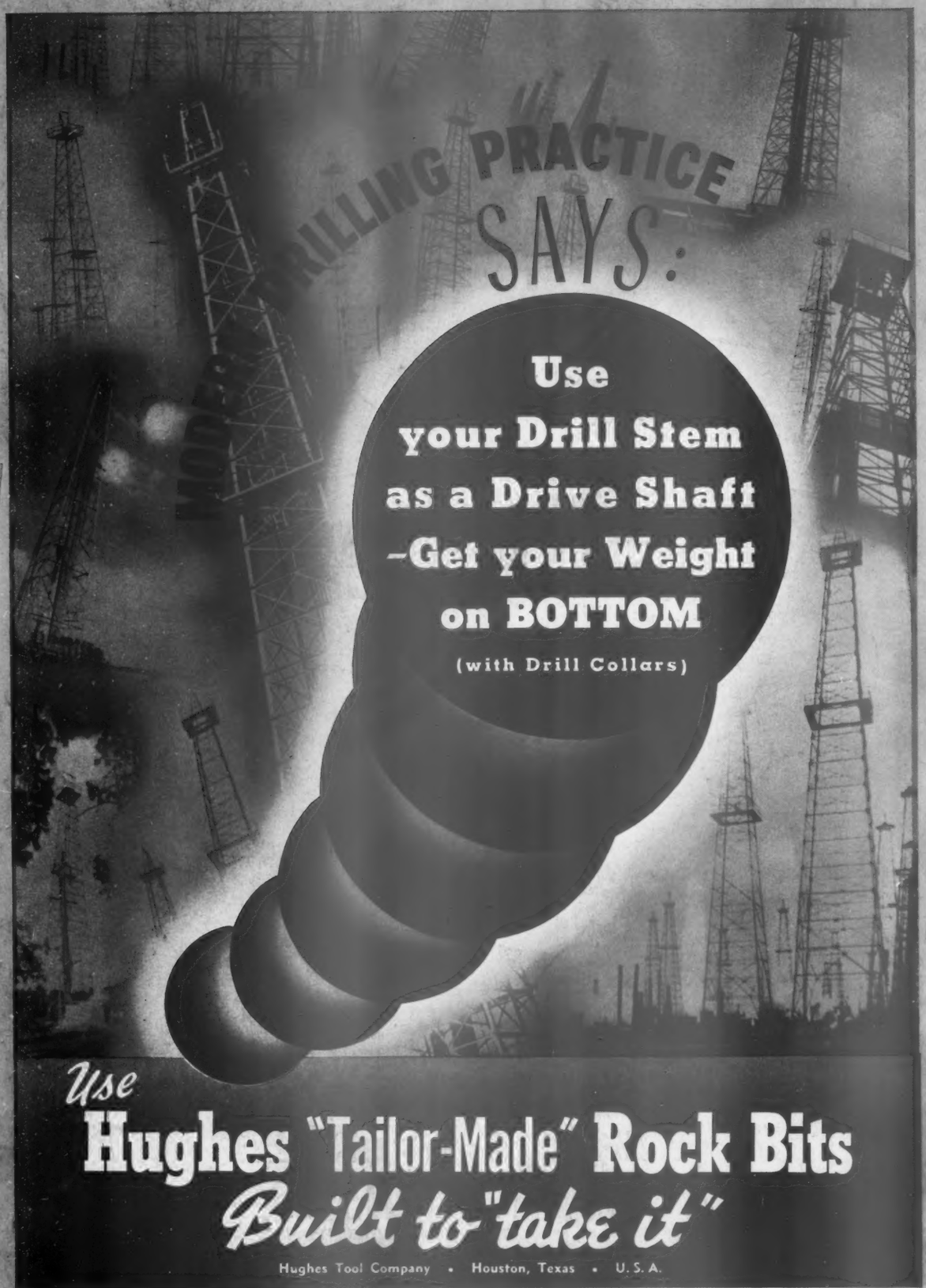
And Larkin Seamless Swaged Nipples are forged from NEW Seamless full weight pipe or casing.

The result is naturally a product that is absolutely dependable and leakproof. Larkin fittings are actually stronger than the lines on which they are used. Furthermore, their length is always uniform and sufficient to allow ample room for pipe tongs.

In sizes one inch and smaller, Larkin Bull Plugs and Swaged Nipples are furnished at no extra cost, in the new improved Hexagonal shape, permitting the use of an adjustable or open-end wrench.

LARKIN PACKER COMPANY, INC.,
ST. LOUIS, U. S. A.

LARKIN PACKER CO.



UNIVERSITY OF MICH
GENERAL LIBRARY
ANN ARBOR MICH
1
23
40